Railway Age

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Indexes to Volume 78

THE indexes to the last volume of the *Railway Age* are now ready for distribution. Those desiring indexes to this valume should advise the New York office, 30 Church street.

Saving a Good Snow Shed

DURING the construction of second track on the west slope of the Rocky mountains the Great Northern decided that some of the comparatively new single track snow sheds were too good to discard. At one point it was, therefore, decided to gauntlet the double track through one of these sheds which is several hundred feet long. The question then arose as to cost of directing train movements safely without incurring the cost of manual block stations, the service of operators, etc., for if such costs were to amount up to $5,000 to $7,000 a year it might perhaps be better to remove the single track shed, construct a second track and reconstruct a double track shed. This problem was solved by the installation of four automatic signals so connected as to provide virtually an automatic interlocking to protect the movement of trains over this section of gauntlet track, leaving this single track snow shed to complete its service without adding appreciably to the cost of operation. This simple installation has already added three years to the life of this snow shed and it still has perhaps 10 or 12 years of service life left. The same system of automatic interlockings is being used on this road with similar economy for the protection of train movements over gauntlet tracks at bridges and also at simple railroad grade crossings.

The Reserve Capacity Is There

THERE are in this country and Canada a few passenger stations in which it is apparent to even the most unobservant of passengers that the capacity is far in excess of the current requirements. On the other hand, anyone who has observed the extent to which the facilities of the new Union station at Chicago are already being used, finds it difficult to understand how it had been possible to handle an equivalent traffic in the old station which it superseded. One answer is that the old station had failed for some time to meet the demands made on it. Furthermore, any unusual conditions, such as a temporary increase in the volume of traffic, was almost certain to cause congestion, upset schedules and introduce serious delays. A second answer is that although the new station presents the appearance of being used to within a comfortable ratio of its capacity, this is purely an apparent condition, the result of operating methods which entail a greater use of the facilities than is necessary for the rendering of good service. For example, the track occupancy is now greater than necessary simply because the tracks are available and there is no good reason why trains should not occupy them longer than necessary. More people occupy the waiting rooms and patronize the restaurants than in the old station for the simple reason that they are attractive; whereas, the uninviting conditions in the old station undoubtedly led many people to spend the time between trains elsewhere. From the standpoint of its effect on traffic, the condition which now obtains at this station is most favorable. Patronage is attracted where there is already evidence of considerable patronage, provided the volume of business done is not such as to militate against the rendering of good service. Large modern passenger stations cost vast sums of money, but they attract business. Furthermore the fact that their construction does lead to a growth of traffic, frequently results in the development of their full capacities more quickly than was anticipated when the plans were being prepared.

The Passengers' Attitude Toward Commutation Rates

TWO railroads entering New York are seeking increased rates for commutation and other reduced-rate tickets and the attitude of a large part of the public affected seems to be one of unreasoning antagonism. Why? No sane person would expect a merchant to sell goods at less than cost. Do these people actually expect the railroads to furnish service on that basis? The chances are that they do not. They simply do not understand, or find it hard to believe, that large profits are not made out of the commutation business. They compare the commutation fares with the city rapid transit fares, without considering how much more expensive commutation service is and the further fact that —in New York—the capital investment in the subways is carried by the tax-payers and not by the passengers. They neglect to consider that many improvements which railways operating suburban services are forced to make —such as expensive stations, grade crossing elimination, and electrification—have little direct bearing on the operation of the railway. Instead they are primarily civic improvements which, in strict justice, should be made in large part at the expense of property-owners who benefit more from them than do the railways. They do not reflect that, if they will demand such improvements and will not pay for them as tax-payers, they must in the long run pay for them as passengers; that other railway traffic cannot bear such expense indefinitely. The problem of suburban passenger traffic cannot be ignored. It is growing rapidly in most places where it exists, while other passenger traffic is stationary or declining. Its relative importance tends, therefore, to increase. It cannot be met and solved with satisfaction to anyone unless the public is accurately, forcefully and repeatedly informed regard-

ing its peculiarities and the difficulties which it imposes upon the railways. A misinformed public has done injustice many times in the past. So long as it remains uninformed the danger of further injustice exists.

England Admires the Employee-Owner Idea

IT has been rather the custom in the past for most of the European countries to regard us on this side of the Atlantic as rather backward in our solution of the problem of industrial relations. Over there all kinds of pension and welfare plans (usually carried out under strict governmental supervision), doles to the unemployed and other forms of state paternalism have grown and multiplied and have been pointed out as "progress" in the attempt to shame us for our slowness to approach the problem with the same solutions. Now, however, there seems to be a growing tendency—at least in England—to doubt the efficacy of the extreme length to which government paternalism has gone over there and to show greater interest in the methods which we are using on this side of the Atlantic. Specifically, admiration has been expressed in many quarters at the success of the extension of employee ownership of securities of the companies by which they are employed which has progressed so far with us. The *Railway Age* is far from advocating a complacent attitude on the part of American industry with regard to the problem of industrial relations. We have not yet solved the problem—a long way from it. At the same time progress is being made, and most of it by activity of the industries themselves and by their employees—very little by government paternalism. So, while we dare not be unduly proud as long as our problem is still with us, yet it must be a source of satisfaction to have the testimony of those who have tried other methods to the effect that ours is the wiser course.

Fusion Welding Don'ts

THERE are many dont's which control and limit the use of fusion welding. Examples of these are: don't weld cracks in boiler tubes; don't weld arch tubes; don't weld on piston rods; don't weld cracked or worn axles. A complete list of all the don'ts which the welder must observe is so formidable as to make it appear that fusion welding as applied to railroad practice is a hazard instead of an aid. It is, on the other hand, common knowledge that most Class I railroads are saving money by the use of welding at the rate of many thousands of dollars a month. Most of the don'ts are necessitated by lack of knowledge of the art. In course of time many of them will become unnecessary and as the list is reduced the profit to the railroads will increase. Many of the roads are doing development work of their own along this line and are interchanging ideas by having men visit the shops of other roads and by encouraging association activities. Much information is needed on this subject and while the railroads are a large user they are by no means the only user of fusion welding. Could not railroad associations that deal with this subject profitably join forces with other associations which also have welding problems? It would avoid unnecessary duplication of effort, it would bring knowledge to bear upon the problems at hand from diversified sources, it would prevent the making of needless experiments and should either increase the use of welding or more exactly define its limitations.

What Is a Locomotive?

WHAT is a locomotive? Most readers of this publication will probably call this a foolish question because each is sure that the answer is one of the ABC's of railroading. But can it be taken for granted that their answers will all be the same, or even nearly enough alike to indicate a common understanding of the fundamental purpose of the locomotive as a part of the transportation machine? There is, for instance, no lack of instances in which the locomotive purchasing policy is controlled on a price per pound basis just as many classes of bulk material, such as rail, bar iron and scrap, are purchased or sold. Obviously the locomotive is not bulk material and it certainly ought not to be regarded in the same category as scrap, and yet where such a policy of purchasing prevails, no other conclusion can be drawn than that the purchaser has not a conception of the locomotive as other than as so much metal.

If a locomotive is not merely metal, then what is it? Again, it seems quite obvious that it is a means of producing transportation units—either car-miles or ton-miles. In producing these transportation units most railroad managements have two objectives. One is to produce them at the least possible cost and the other is to produce the most of them possible with the least total capital investment. The former requires a locomotive carefully proportioned and equipped to develop the highest possible thermal efficiency and of sufficient capacity to handle a satisfactory train load. The second requires a sustained capacity that will produce the greatest possible output of transportation units in any given period of time. In other words, it requires sustained horsepower capacity. Are these objectives not suggestive of a more rational basis of locomotive price comparison than the price per unit of weight? In the case of a freight locomotive, for instance, the number of ton-miles produced per train hour is rapidly being accepted as the best basis of train performance comparison. This involves the factor of starting tractive force, on which the train load depends, and the factor of speed. Why not, then, base price comparisons on the expected sustained horsepower capacity with perhaps a supplementary comparison of the operating costs per horsepower hour?

Western Roads Far Short of Fair Return

THE need for higher freight rates for the western railroads and particularly those of the Northwestern region is again emphasized by the statement just published of railway earnings for May and five months of the calendar year 1925. Whereas in 1924, as cited by the roads in their petition to the Interstate Commerce Commission for an increase in revenues, the western roads had a net railway operating income representing a return of 3.87 per cent on their property investment, which would require an increase of 10 or 11 per cent in freight rates to bring it up to the fair return basis of 5¾ per cent, for five months of 1925 they have earned at an annual rate of only 3.13 per cent, which indicates a shortage equivalent to an advance of about 15 per cent in freight rates.

The rate of return of the western roads for five months was the same as that shown for four months in the report issued a month ago. While the northwestern roads made a slightly better showing for five months than they did for four months, 2.13 per cent instead of 1.92 per cent,

the roads of the Central Western region did not do quite so well, earning at the rate of 3.22 per cent instead of 3.35 per cent, while the southwestern roads improved their showing slightly, to 4.29 per cent instead of 4.27 per cent. All three of the western regions, however, made a worse showing than that of the roads of the United States as a whole, which earned at the rate of only 4.38 per cent both for four months and for five months. The roads of the Eastern district earned at the rate of 5.10 per cent and those of the Southern district at the rate of 5.55 per cent. The Pocahontas region alone, with a rate of 6.52 per cent, made a better showing than the fair return basis.

Mark W. Potter, until recently a member of the Interstate Commerce Commission and now one of the receivers of the Chicago, Milwaukee & St. Paul, has proposed a plan, based on a theory of uncertainty whether a straight general increase in rates is possible or proper, calling for an increase of only 5 per cent in freight rates for all western carriers, to be pooled and redistributed among the roads in proportion to their shortage as compared with a fair return, so that the weaker roads would receive more than a 5 per cent increase and the stronger roads would receive less. Whereas the western roads earning less than 5¾ per cent in 1924 had a deficit of some $181,000,000 as compared with a fair return, his plan would provide an increase of only $82,236,856 a year, which he figures would produce a return of 4.77 per cent for the western district (using the basis of 1924 earnings and 1923 property investment). According to the table published with this plan 53 of the Class I western roads would still receive less than 5¾ per cent and the only roads to receive as much as the fair return basis would be the 11 roads that did so in 1924, while of the 53 roads only 11 would receive as much as a 5 per cent return.

Buying Tool Value

ADVERSE comment is frequently heard to the effect that in buying shop machinery and tools the railroads pay too much attention to price as opposed to serviceability, and thereby secure machines deficient either in the quality or amount of work which can be done with them. Not all of this criticism is justified, as shown by the fact that many new railroad shops, and old shops recently re-equipped, contain some of the finest, most reliable machine tools now on the market. Some foundation for the criticism will, however, be admitted by more than one shop superintendent or master mechanic who has specified a particular tool on his budget and had to accept another tool less satisfactory simply because it was lower in price.

Pertinent comment on this subject was made by E. F. Du Brul, general manager of the National Machine Tool Builders' Association, in the June issue of the Railway Mechanical Engineer, as follows: "The lower price, all other conditions being equal, should command the business. But in buying a machine tool one buys an individualized product. No two manufacturers build tools that are identical in structure. To decide sensibly as between two similar machines, many things must be taken into consideration before one can really say that Tool *A* at its price is preferable to Tool *B* at its price. This determination is an engineering function." Calling attention to the necessity of co-operation on the part of all business enterprises in the interests of industry as a whole, Mr. Du Brul said, "It is to the common interest to the roads, the public, and the machine tool industry that railroad purchases of machine tools be made on the engineering basis and not on the mere basis of price. . . . In most cases where the mechanical department has the actual power of decision, the decision is made by 'general impression' rather than by definite scoring. The mechanical men 'like' such and such a machine more than they do another similar one, but they seldom put down the reasons for their likes and dislikes on paper. In other words, they do not definitely analyze and 'score' the machines, one against the other. Naturally, when the purchasing or financial authorities want to know why they are asked to pay more for one machine than is asked for another, the mechanical officer is at a loss for an answer if he has not gone at the matter in a cold-blooded engineering way." Railroad executive officers today are not intentionally overlooking any opportunities either to make money for their respective roads or to reduce expenses. It would seem to be distinctly up to the mechanical men to show in black and white, first, the savings which can be effected by new shop tools, and second, when a particular machine is needed which costs more than others of a similar type on the market, that the results accomplished with this machine will justify the additional expenditure.

Improved Employee Relations

IT is just a little more than a year since the *Railway Age* announced the result of its competition on co-operation in the interests of greater efficiency and more economical operation—a competition that was more than ordinarily successful, both as regards the unusually large number of entries and the quality of the material. It is almost exactly one year since the first prize article was published.

There has been a steady improvement in the relations between the employees and the managements for several years and this has been reflected in the greater efficiency of operation and the better utilization of plant and facilities, which has been so noticeable during the past two or three years. It is difficult to measure the progress in improved relations during any one year and particularly for the past year, but many developments indicate that it has been really remarkable.

Examples of this are the closer getting together of the managements and the employees, by getting first-hand and prompt information to the employees as to the conditions of the properties and the difficulties under which they have been operating. Closely associated with this have been the large number of general and departmental conferences and educational campaigns looking toward specific improvements, but all of which have helped to bring about closer personal contacts between the officers and the men and thus promote better understandings. Then, too, get-together or better relationship meetings have been held on many roads under the auspices of the Railroad Y. M. C. A. Another important factor has been the tendency on a number of roads to encourage foremanship training classes or supervisors' clubs, which give much consideration to the factors involved in better leadership, thus taking advantage of the best thought and developments in business and industrial management.

On the railroads, as in the industries, there has been a decided reaction against the old-fashioned paternalistic welfare work and the tendency has been to induce a larger and larger degree of co-operation on all matters relating to the employees' welfare. Some of the railroad managements have also been keen to take advantage of constructive work which has been done by personnel and employment departments in the industries. This is shown by the appointment of officers to head up per-

sonnel work; sometimes this has been done by appointing a vice-president or other officer in charge of personnel, but in many cases men who are particularly well fitted for advising on matters of this kind have quietly been added to the staffs of the chief executives and much constructive work has been done and real progress made without the blowing of trumpets.

Another important advance has been made through the inspiration of the Younger Railroad Men's Conference at Detroit, in encouraging a larger interest on the part of railroad officers and foremen in the proper placing, training and developing of the younger men in the organization. The co-operative movement on the part of organized labor which started in the mechanical department on the Baltimore & Ohio, has been extended to the Canadian National and the Chicago & North Western.

These are only a few of the great number of things which have been happening during the past year. Close observers report that the improvement in employee relations on the railroads throughout the country during the year has been extremely noticeable. This is clearly shown also by many letters which have been received by the *Railway Age* during recent months from men in various departments and from all over the country, expressing enthusiasm for this change in attitude and in some cases acknowledging a great change in the personal opinion or attitude of the writers. Then, too, there are a large number of experiments being conducted on the different roads, many of which will undoubtedly prove successful, although some may fail, which we have not been privileged to describe, but which give great promise for the future. Slowly, but surely, the emphasis in the railroad world is beng changed from *materials* to *men*.

New Books

Education, the Machine and the Worker, by H. M. Kallen. 204 *pages. 5 in. by 7½ in. Bound in paper. Published by New Republic, Inc., New York. Price,* $1.

This book is a valuable contribution to the literature on workers' education and is of first rate importance to those railroad officers whose duties cover the supervision of personnel and industrial relations activities—particularly where any kind of employee education is included. Few *Railway Age* readers will subscribe to all the author says. Yet despite some of the book's shortcomings, which arise largely from the author's one-sided view of industrial problems, it is probably one of the most searching examinations of any yet undertaken into the reasons for employee education and the general policies which should guide it.

The author's viewpoint is wholly that of the labor union. He has written his book, not to help industries in their employee education programs, but to help the labor unions form educational policies which will give them a firmer footing in industry. This fact, however, does not make it any more difficult for industries to profit from the penetrating observations which he has made; and indeed if labor unions generally would educate their leaders and their members to the industrial capability urged by Dr. Kallen, they might be *persona* considerably more *grata* to industrial managements than they are at the present time. The author's labor union bias has not brought him to an uncritical view of union leadership and policies—quite the contrary. He has set down in this book so much searching and pointed criticism that one could almost make a complete case against the unions from the testimony which he, their friend, has offered. Witness his comments on labor union leadership which follow in abstract:

> Initially, its qualities are selected by the needs of a labor union as a battle-formation. The accumulation of grievances, the protest, the organization for strike, the conduct of the strike bring to the front the man or the woman with the strongest voice, the greatest eloquence. Persons so endowed can keep their aggrieved listeners in a state of emotional tension. They can make and sustain morale. They can arouse determination and inspire combat. Invaluable when a union is forming, their temperament and habits unfit them, as the union gains in power and influence, for the new responsibilities that development brings. They become, as the union adjusts its form to its new functions, drags upon its progress. In too many cases they show themselves unable to perform the tasks which the extended responsibilities impose. Nevertheless, they continue to get themselves re-elected to office by the exercise of the very powers that render them no longer fit to hold office. Confidence and prestige are withdrawn from organized labor—*vide* the building trades—even as it gains power.

Dr. Kallen says this, not as a foe of organized labor, but as its ally—as one who is trying to help it mend its fences where they most need mending and he has correctly diagnosed a very grave disease—unprogressive leadership—from which a large part of the labor movement in this country appears to be suffering. Attention has been called to the same phenomenon in the *Railway Age,* particularly with reference to the late Warren F. Stone of the Brotherhood of Locomotive Engineers, who in spite of the fact that his organization is everywhere recognized and in spite of the sweet reasonableness of some of his philosophical utterances as they appeared in the B. of L. E. Journal and "Labor," continued to conduct himself as if the battle for recognition of his union were still going on and as if it were necessary for him to pour vitriol on railroad management whenever he could. In deed, Dr. Kallen goes farther and, in commenting upon the ridiculous dispute between Mr. Stone and John L. Lewis over union activity in the B. of L. E. mines, says:

> Here, very obviously, the habitual attitudes of mind have carried over from other situations; tradition dominates intelligence, and the labor movement as a whole is made ridiculous. Nothing could more dramatically exemplify the need for a relevant labor education.

Dr. Kallen contends that public education, so long looked upon as the savior of the workingman, has not produced the results which were expected of it. It has not improved the prospects of his children for a good life nor made better workmen of them. It has not diminished crime. This does not mean that it has not accomplished anything, but that it has not accomplished everything—that it must be supplemented by something else. "For the multitudes who must live by toil, instruction immediately matters when it facilitates the tasks and processes of making a living."

The sentence quoted just above gives the author's concept of what workers' education should be. But this, he points out, is the one thing which workers' education, where it has been carried on by the labor organizations, has in most cases not been. Note the various "labor colleges" which have sprung up in various places in the country. At these schools, the instruction has been mainly either in literature or art or in economics and other social subjects viewed from the idealistic standpoint of socialism or some other fanciful panacea for our industrial troubles. The author is no conservative—indeed many opinions which he advances in this book are profoundly, not to say unfairly, critical of things as they are—yet he views socialism, communism and the various other radical "isms" as having little foundation in actualities. Instead they present a complete picture of an ideal state which, he contends, serves only to give their followers something to day-dream about while they are working and living under present conditions. A man performing some tiresome routine job which requires very little direct mental attention can do one of two things with his mind while he works. He can really put it on his work; learn not simply that his machine *does* operate in

such a way, but *why* it operates in that way; he can look about him and observe some of the other operations of the factory where he is employed. Or, on the other hand, he can spend his time in idle day-dreams, imagining himself a great figure in the world's affairs, and, if he is a socialist, his day-dreams will take a socialistic turn. He will imagine the ideal conditions which will obtain when socialism prevails. Now, Dr. Kallen contends that most workers' education which has been provided or subsidized by the labor organizations has fostered the second procedure rather than the first. It has encouraged the students to escape in their imaginations the actualities of present life, rather than to master the technical details of life and thus acquire power over it. And the fact that a worker spends his time in socialistic day-dreaming, instead of acquiring a thorough knowledge of his industry, tends to keep him from gaining the power by which he might make his dreams come true!

Dr. Kallen, writing as he does from the labor union viewpoint, looks with disfavor on schools operated by industries for the education of their personnel—largely because, he says, "their concern is not primarily with the human values resident in the industry. Their concern is primarily with the cheapness and efficiency of production for the purpose of profit." Yet he admits that the company schools, which for the most part emphasize practical, rather than "escape," subjects, are really doing more for the good of their employees by teaching them the technique of their industry than are the labor schools which specialize on "escape" courses, such as literature and socialistic economics.

We think that he is wrong in characterizing schools operated by companies as being dominated by the immediate profit motive to the disregard of human values. This may be true of some such schools. And, as far as that goes, every human act can be ascribed to some form of selfishness. But there is such a thing as altruistic selfishness, just as there is selfishness which is foresighted and which looks beyond its current profits. And where industrial corporations take a long look to their own well-being, they are often inclined to a social point of view. Maynard Keynes, the English economist, in a recent discussion of the Bank of England in a letter to the Times (London) said that large private corporations in the course of a century of existence tend either to become institutional in character and to adopt an unselfish, social point of view, or else they tend to decline in power and eventually to disappear. We are just a little afraid that Dr. Kallen, along with many other honest-intentioned liberals, is somewhat inclined to deal harshly with the industrial establishments which have become disgusted with the very shortcomings of the unions which he himself recognizes and, for that reason, are attempting to work out their human relations problems without union participation. As long as the unions are as unfortunate as they have been up to the present in their policies and in their leadership, how can it consistently be believed that more good can come by dealing with them in spite of their failings that can come from the initiative of some far-seeing employer? However, it is not necessary to agree with every point which an author makes in order to derive benefit from his book.

Dr. Kallen devotes a good part of his book to a discussion of the co-operative plan in operation in the Baltimore & Ohio shops. He highly approves of it as providing the kind of education which employees should have. It teaches them to see their industry somewhat from the standpoint of the management and to learn something of the management's problems. They tend to see their jobs in the light of the whole industry and not merely from the standpoint of their own particular duties. The major fears of a workman's existence, lack of employment and inadequate wages, are lessened and a pride of craft and a pride in his industry and his part in it tends to succeed. Certainly the B. & O. co-operative plan is proving a most interesting experiment, although we would point out in company with the reviewer who reported on this book for the New York Times that Dr. Kallen might have found a somewhat similar solution being broached on some roads which do not recognize the national labor organizations.

There are many other interesting things in this book, but these remarks will suffice to denote its trend. Incidentally, it might be well to call attention to the fact that Dr. Kallen is quite capable of discussing the subject which he has undertaken. In the first place, he is a teacher of philosophy and, consequently, not subject to the mistakes which well-meaning amateurs are inclined to make when they undertake the discussion of philosophical subjects, of which number, of course, education certainly is. Moreover, he has been actively associated in a consulting capacity in the solution of personnel problems in the clothing industry in New York. It is, perhaps, regrettable that Dr. Kallen has written the book more in his capacity of philosopher and psychologist than as a personnel consultant—he has often made use of the esoteric terms of psychology where simple every-day English would have served as well. These terms, however, are not sufficiently difficult to baffle seriously the reader who is studiously enough inclined to be interested in reading such a book, so perhaps no grave harm has been done.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

The Ports of Seattle, Tacoma, Bellingham, Everett, and Grays Harbor, Washington, prepared by Board of Engineers, Rivers and Harbors, War Department, in co-operation with Bureau of Research, Shipping Board. Port Series no. 7. For railroad facilities at each port, see Contents, under "Communications." 470 pages, illustrations, maps, charts. Pub. by Government Printing Office, Washington. $1.70.

Procedure and Proof before the Interstate Commerce Commission in Rate and Allied Cases, by Harleigh H. Hartman. 181 p. Pub. by I. T. Hanson, Washington, D. C. $8.

Periodical Articles

The Antiquities of American Business, by Mark Sullivan. Industry a century ago, including early railroads, and instances of continuity of control. Includes photographs of first presidents of the B. & O., and Pennsylvania, p. 294 and 295. World's Work, July, 1925.

Chicago, Milwaukee & St. Paul Railway Co., by V. G. Sanborn. Discusses proposed re-organization plan. Magazine of Wall Street, July 4, 1925.

The Conquest of Canada by Rail, by John R. Bone. Historical sketch of railroad expansion. Boston Evening Transcript, July 3, 1925, part 5, page 2.

First Spikes in Railway History in England and America, by A. Saintsbury. Boston Evening Transcript, July 3, 1925, part 5, p. 2.

Granite Railway First in America. "This road ran from Quincy quarries to Neponset River and was opened in 1826." Boston Evening Transcript, July 3, 1925, part 5, p. 2-3.

Letters to the Editor

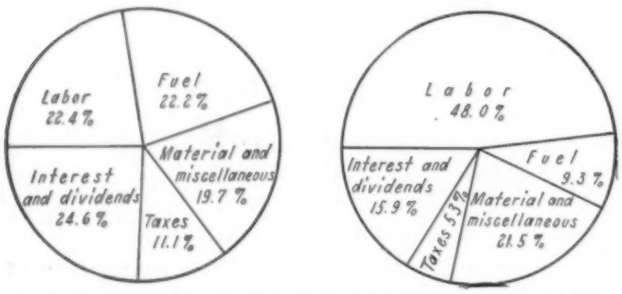
Public Utility Compared with Railway Operation

CHICAGO.

TO THE EDITOR:

The year book of the Commonwealth Edison Company, Chicago, for 1924 suggests certain comparisons with railway operation through charts which it presents showing the distribution of its revenues. In the comparisons it is shown that of each $1 of revenue of the public utility, labor takes 22.4 per cent, fuel 22.2 per cent, material and miscellaneous 19.7 per cent, taxes 11.1 per cent and interest and dividends 24.6 per cent. In comparison, of each dollar of revenue on the railroads, labor takes 48 per cent, fuel 9.3 per cent, material and miscellaneous 21.5 per cent, taxes 5.3 per cent and interest and dividends 15.9 per cent.

Several interesting conclusions may be drawn from the above illustrations of the use of a dollar paid for railroad transportation and of a dollar paid to another highly developed public utility. First, obviously, the



Commonwealth Edison Company Railroads of the United States—Graphic Comparison of Division of Income

power company is more highly developed. It spends only 22 cents of each dollar for labor in converting fuel into light and power, while the railroads spend 48 cents of every dollar for labor in producing transportation. Second, power company development has been made by large investments in modern and economical facilities for converting fuel into light and power. Third, this investment requires and enables the utility to provide a much larger sum for return on investment and a larger proportion for taxes than the railroad is able to provide.

It may seem from the above that labor is better treated by the railroads than by the public utility since it receives practically one-half of the revenue. This is not, as a matter of fact, the case. The power company's labor is more productive than the railroad labor with the help of the capital investment, which shares equally with it in the division of income.

Admitting an increased mechanical efficiency of an electrical power plant over a steam locomotive of about 3 to 1, railroad labor is still only 50 per cent as efficient in converting fuel into power or transportation on the basis of its relation to the value of the amount received for its product. This is due to one or all of four conditions. 1. Inadequate and inefficient facilities. 2. Inadequate rates or value placed on the product. 3. Different and more difficult conditions in railroad service. 4. Actual inefficiency of labor or management.

The railways, if allowed adequate revenues, thus assuring capital a return on added investment, would approach the power company in development and in the relative productivity of its labor. Thus the maximum of efficient transportation would be furnished to the substantial benefit of industry in general. Railroad labor could be paid for more efficient production and capital would be insured a reasonable return on its investment.

C. H. WESTERBROOK,
Assistant General Auditor, Chicago & North Western.

A Satisfied College Graduate

MISSOURI.

TO THE EDITOR:

Every week I manage to secure my employer's *Railway Age* for an evening and read it from cover to cover with keen interest. But the articles that are of special interest to me are those pertaining to the college man in the railroad game, being one myself.

The letter written by Mr. Begien in the issue of May 16 covers my case exactly. I entered the transportation department of a Class I railroad just eleven months ago, five days after I had received my A. B. degree from one of the countries' finest small colleges. I commenced work in the office of the vice-president of operation and enjoyed my work for a few months but became dissatisfied, feeling that I was not gaining any very valuable knowledge.

During my senior year in college I felt that if I were to enter the railroad field I would need shorthand and so learned one of the various systems and began as a stenographer working for the vice-president's assistant and also for his chief clerk. In two months I was asked to take over the chief clerk's work entirely and did so with a small raise in salary, but I was not satisfied. An opportunity came to get out on the road as secretary to division superintendent on one of the busiest divisions on the road.

I have been on this job two months and one half and am well satisfied, even though I left my home, am receiving no more salary and am located in an obscure and remote district, as Mr. Begien expresses it. I am learning a great deal, spending the evenings during the week in the dispatcher's office watching the movement of all trains over the division. On Saturday nights I usually arrange to climb into the cab of one of the locomotives on any one of our fast passenger trains. One would say that I had very little pleasure but it is all pleasure to me and I know that several people think it funny that I should "hang around" so much.

Will the knowledge and training I am getting enable me to advance? Could I be farther in ten years had I entered a commercial house? I am not one of those who desires to start at the top as the reader can readily see after noting the change I made. I am going to get to the top if there is any possible chance. I haven't had many discouragements yet and am getting ten dollars more a month than I did when I started eleven months ago. Several influential men discouraged my entering the railroad business and offered to assist me in securing other employment. Some day I hope to be able to say that I chose the right course and possibly take them for a ride in my business car. I desire to make it known that the college man is an asset to a railroad and that a college man can succeed in the game. I am happy with my job and I am in the game for good no matter where the course takes me. Maybe I'll be a stenographer the rest of my life. I'll write you another letter in ten years and give you the benefit of what I've found.

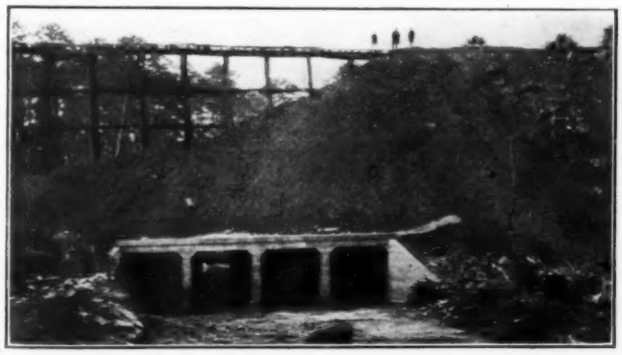
SECRETARY TO SUPERINTENDENT.

The Piers for the New Higher Level Tallapoosa River Bridge

Central of Georgia Reconstructs Columbus-Birmingham Line

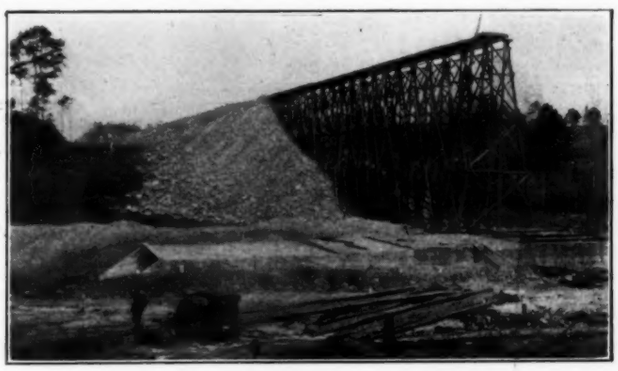
Difficult and extensive revisions necessary to provide better grades and less curvature

THE Central of Georgia is at present reconstructing the major part of its line between Columbus, Ga., and Birmingham, Ala., at an estimated cost of over $4,500,000 in order to eliminate the heavy grades and curves which now handicap operation. This work necessitates the construction of 48 miles of new line and the revision of grade and line on a large proportion of the remainder of the 133 miles of old line with which this project is concerned. Its completion will permit trains to handle double the tonnage now handled and will insure operating and other economies which will give an estimated average return of over 22 per cent on the investment. The work is of an extremely heavy nature, involving a large number of heavy cuts and fills with a total of about 6,530,000 cu. yd. to be moved, much of which is rock. Maximum grades eastbound, the direction of heaviest traffic, will be 0.5 per cent compensated. The maximum curvature on all new work will be three degrees.



A Box Culvert and 75-ft. Fill Are Typical of the Work

The line between Columbus and Birmingham is 157 miles long and handles a comparatively heavy freight and passenger traffic, the latter including considerable through business from northern points to Florida and return. The predominating movement of freight traffic is eastbound, the tonnage in this direction being nearly double that westbound. The industries which the line serves include farming, manufacturing, lumbering and mining. It also handles through traffic from the north



A 75-ft. Fill at Manoy Creek Near Jackson's Gap

and west to the port of Savannah and return. The greater proportion of the eastbound traffic, however, is coal which is obtained from the Alabama mines northeast of Birmingham. This traffic comes on the main line at Henry Ellen, about 16 miles east of Birmingham.

About 20 miles east of Birmingham, the line crosses the summit of the main mountain range in this section of Alabama by means of steep grades and through two tunnels in what are known as the Coosa and Oak mountains. From this main range east to about the vicinity of Opelika, a distance of slightly over 100 miles, the line passes through a rough finger country, the last outcroppings or foothills of the Blue Ridge mountains. The original roadbed was largely of pioneer construction, having been built with limited funds during the period from 1869 to 1888. As a result it followed the contours of the land very closely with little or no grading. This gave a line with grades as high as 1.5 per cent and many sharp curves, often in rapid succession and reversing, up to 8 deg. maximum. From the eastern end of this section, that is, from Opelika to Columbus, the old line was comparatively good and chiefly descending eastbound; some power was turned at Opelika and double tonnage handled from there to Columbus, about 29 miles. However, with the continued growth of traffic, the operation of this line became more and more congested and the opportunities for economies so great that the project could easily be justified and it was, therefore, authorized in the early part of 1924. Actual work was started on May 22, 1924, and it is expected to have the reconstruction completed by the latter part of this year.

Studies of grade and line revision between Columbus and Birmingham had been made as early as 1909 on the basis of a 0.6 per cent maximum grade eastbound but were abandoned due to the excessive cost which they

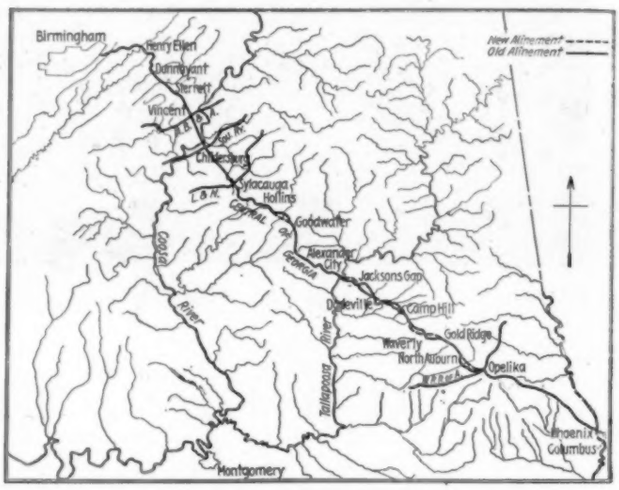
The New Work Was All of a Heavy Nature

indicated. The estimates at the time showed that over one-half of the expenditures would be absorbed in the first 20 miles of line east from Birmingham. Other studies made in more recent years showed that, under the conditions existing at the west end, the revision of the grades up the Coosa and Oak mountains was not a vital factor and that the operation of this line could be handled in an efficient and economical manner, provided the line to the east of the mountains was improved.

Further studies east of the mountains resulted in a revised profile giving maximum grades eastbound of 0.5 per cent compensated, except at one point known as Trammels Hill, and maximum grades westbound of 1 per cent compensated. The maximum curvature allowable on new work was 3 deg. The effect of the reconstruction on the characteristics of the Columbus-Birmingham line is better evidenced by the following:

Distance reduced	4.779 miles
Curvature reduced	3545 deg. of central angle
Curves eliminated	89
Rise and fall eliminated	1036 feet
Highway grade crossings eliminated	40
Railway grade crossings eliminated	2

As has already been stated, the larger proportion of the eastbound traffic is coal, secured from the fields around Birmingham and brought out to the main line at Henry Ellen. This traffic is brought out by switchers



Map of Columbus-Birmingham Line, Showing Streams and Points of Crossing with Other Railroads

and will be moved by them over the summit to Dunavant where a new storage yard is being constructed. Freight will continue to move east out of Birmingham with the normal tonnage ratings of 1,250 tons and 2,145 tons to Dunavant where they will be filled out to 2,940 tons and 4,950 which will be the ratings for heavy Mikados and Mallets respectively into Columbus. Since coal forms over 50 per cent of the eastbound traffic, this will always insure full loading eastbound. East of Sylacauga, there is a 6½-mile 1.35 per cent grade known as Trammels Hill which it has been found impractical to eliminate and at this point it will be necessary to utilize pusher service of the Mallet type. At the present time 13 Mikados and 10 Mallets are used in freight service but as the conditions of the line are such as to make engine speed an important factor in operating over it, all new power purchased will be of the Mikado type. Westbound, a heavy proportion of the traffic will be empty coal cars and this condition permits of an evenly balanced locomotive movement with the maximum grades of one per cent compensated. However, where the line is relocated the westbound grades are being reduced to 0.7 per cent. The empties are to be set off at Dunavant yard where they will be picked up by the switchers returning to the coal fields, thus reducing light engine mileage to a minimum.

The studies for this grade and line revision were made on the basis of the traffic necessary to insure a 7 per cent return on the estimated investment. With the exceptions of the years 1914 and 1915, the traffic of the Central of Georgia has shown a steady and substantial increase. These figures had been plotted and a curve made showing the average trend of traffic over a period of years and the probable future amounts. During the last four or five years this estimated traffic has been greatly exceeded. The analyses showed that in order to obtain the

desired 7 per cent return on the investment, a traffic of 2,192,600 tons would be necessary, costs being figured on a 1923 basis. This needed traffic was below the levels of all the years back to 1919, the traffic in 1923, for example, being 4,050,000 tons. The estimated cost is $4,657,410 and, making the proper evaluations for the savings in operation that would be effected on the basis of the average traffic as shown by the trend, the results showed an average return of 22 per cent for the period of 1926 to 1931 inclusive. If the traffic should remain at a level higher than the estimated averages, as it has during recent years and as the development of the country indicates

Drag Line Placing an 850,000-cu. yd. Fill Near Opelika

that it will continue to do, the return will be correspondingly greater. The value of the property which will be retired is approximately $400,000.

In carrying forward the reconstruction of this line, the work has been divided into 17 separate projects which are being handled by seven general contractors and supervised by seven resident engineers. The resident engineers work under the direction of a construction engineer located in the field. The relocation amounts to a total of 48 miles of new line which is chiefly in small units, connecting sections of the old line which are being revised to the

Some of the Grading Was Done with Wheel Scrapers

new standards of grade and alinement. Thus the alinement shows no particular divergence from the general alinement of the old line but a much better alinement has been obtained. The divergence is so small in many places that it cannot be shown on a small scale map such as accompanies this article and even the greater divergences had to be exaggerated slightly in order to make them clear. The map's main service is that it indicates the location of the line and helps to emphasize the relation of the alinement to the drainage conditions.

As may be expected, a wide variety of excavation was encountered in carrying forward this work and much of it was in the form of rock of differing characteristics. The formation of the rock where it was encountered showed the result of a widespread disturbance or upheaval, the rock strata being almost invariably inclined at an angle of about 45 deg. to the horizontal. This resulted in difficult shovel work and necessitated blasting at almost every place that it was encountered. The total yardage involved is estimated at 6,530,000 cu. yd., the filling being in excess of the cutting. This was made up by borrowing from the cuts, wherever the class of excavation made this practicable, or from pits.

The new line continues to serve all of the towns formerly reached by the old although in two instances special provisions had to be made. At Waverly, about 1¼ miles of the old line will be left in place to act as an industrial spur to this town. Dadeville, the other point, presented a more elaborate problem since the old line in this section was in the form of an almost complete loop to the north of the town with the southern extremity of the loop just touching the outskirts. The relocated line lay about three-fourths of a mile further north and thus to serve Dadeville it became necessary to leave the old loop in place so that local freight and passenger trains

Typical Rock Formation Which Was Encountered

could be operated over it, connecting with the new main line at some distance both ways from the town.

The projects are numbered from the west end, Project 1 starting at Sterrett, 6 miles east of Dunavant and Project 17 ending at Phoenix City, Ala., just over the state line from Columbus. The first work consists of about 6 miles of relocated line at a maximum average elevation of 552 and passes through broken country with an almost continuous succession of heavy cuts and fills averaging from 35 to 60 ft. deep. The east end of this work is at Arkwright where there is a grade crossing with the Atlanta, Birmingham & Atlantic which is being eliminated by lowering the tracks of this road about 9 ft. and elevating those of the Central of Georgia about 17 ft. From Arkwright to Sylacauga the line passes through the valley of the Coosa river (Elev. 435) on good grades and alinement, following which there is five miles of new work in rolling country preparatory to climbing up out of the Coosa valley on the 6½-mile Trammel's Hill grade. At Childersburg in the valley, there is a grade crossing with the Southern which is being eliminated by elevating the tracks of the Central of Georgia about 28 ft. and carrying them over the Southern's track and through the town on a concrete viaduct 502 ft. long.

The old grade ends at Trammels and from this point east the line is up in the top of the foothills of the Blue

Ridge mountains, the actual summit of this section being east of Trammels with an elevation of about 860. The country from Trammels to Hollins, Project 5, is exceedingly choppy and required practically all new work. From Hollins to Parkdale, Project 6, the grade of the old line has been revised and there is only a little relocation. This is on the east end and this new work continues on through to Goodwater, the end of Project 7. One large fill 90 ft. high was encountered in this section and it was also necessary to bridge one creek for which purpose an open deck plate girder viaduct on steel towers 106 ft. above the water, was used. Projects 8 and 9 cover the territory from Goodwater (Elev. 845) to Alexander City (Elev. 711) at which latter point the tracks are being lowered about 15 ft. east of the town. From a yardage standpoint, the work on these two projects with a few exceptions is not heavy, although practically all of it is new construction. A considerable part of the alinement parallels the old as it was found to be cheaper to build a new line in this section than it was to revise the old one under traffic.

From Alexander City to Opelika, Projects 10 to 16 inclusive, the work is chiefly relocated line of the heaviest type of construction, interspersed with sections of the old line with attendant grade and line revisions upon them. East of Alexander City and near Sturdivant, the road crosses the Tallapoosa river on a new alinement and 15 ft. above the old grade. This was necessitated because of the future raising of the water level of the river due to the Cherokee Bluff water power project, involving the construction of a dam 150 ft. high about 18 miles down stream. This is being done by the Alabama Power Company and in view of that fact, this company is constructing the bridge and approaches. The Tallapoosa bridge is

The New Line Eliminated Many Curves, Some Reversing, in This Section

990 ft. long and consists of eleven 90-ft. girder spans on concrete piers. Two other streams between Alexander City and Opelika necessitated bridging. These were the Sandy Creek and Chattasofkee Creek crossings and required structures 220 ft. and 250 ft. long respectively, utilizing plate girders and concrete piers.

This section of the country is exceptionally rugged and the grading work consists of a continuous succession of deep cuts and heavy fills with depths or heights up to 80 ft. and yardages up to 800,000 or slightly more. The largest fill from the standpoint of yardage is located slightly west of Opelika, the fill being approximately one mile long and with a maximum depth of 80 ft. The estimate for this is 800,400 cu. yd. This fill contains the longest culvert on the line, 247 ft. long. It is of the two-barrel type with openings of 10 ft. 3 in. by 8 ft. and is built of reinforced concrete. The first 40 ft. of the filling is being placed by drag line, working 24 hours a day. The remainder will be placed by dump cars operating on a construction trestle in the usual way. Most of the heavy filling on the line is being handled by steam shovels, dump cars and construction trestles, some 23 shovels being employed at all times. In certain sections the lighter

Backing Through a 75-ft. to 90-ft. Cut

work is being handled with wheel scrapers, approximately 500 teams being employed for this and similar work.

Leaving Alexander City at an elevation of approximately 711, the line drops down to the Tallapoosa river (Elev. 513), then ascends on maximum grades to an elevation of 695 near Buck Creek, about 3 miles east of Jackson's Gap. From this point to Waverly, a distance of about 18 miles, the grade remains in a general plane between extremes of 620 and 720. From Waverly east to Opelika, about 14.5 miles, the grade is chiefly ascending, reaching an elevation of approximately 800 at the latter point. The heavy construction ends at Opelika and from that point east, the construction is only concerned with a number of stretches where it was desirable to eliminate the existing hill and dale profile. Most of the work is of a light nature and is being done under traffic. The grade is chiefly descending eastbound, reaching an elevation of about 300 at Phoenix City, making a 500-ft. drop over a distance of about 29 miles.

All of the revision will be "permanent" work, the bridges being steel and concrete and the culverts, underpasses and overhead highway bridges of concrete, some of the latter, however, also being constructed of creosoted pine timbers. For the track construction, creosoted pine ties, fully tie-plated and 90-lb. A. R. A. rail is being used on slag ballast. The old passing tracks which are to be continued in use will be lengthened to 4,950 ft., the 100 car standard for all new tracks of this nature.

The studies, plans and construction of the line were made by and are being carried forward under the direction of the engineering department of the Central of Georgia, C. K. Lawrence, chief engineer. The work in the field is in charge of Epping Gabbett, construction engineer, reporting to H. F. Sharpley, principal assistant engineer. The contractors are the Brooks-Callaway Company, Atlanta, Ga.; the Hardaway Contracting Company, Columbus, Ga.; J. A. Kreis, Knoxville, Tenn.; The Luck Company, Asheville, N. C.; the Nichols Contracting Company, Atlanta, Ga.; the O'Brien Construction Company, Birmingham, Ala.; and the Duplin Construction Company.

Improving the Morale in Stores Organization*

Special attention given human side of operations in prevailing practices on Lehigh Valley

By W. J. McKaig
Division Stores Officer, Lehigh Valley, Easton, Pa.

ONLY a very few years ago, almost any floater who sought out the store department on the Lehigh Valley for employment was hired on sight, turned over to a foreman and put to work without more ceremony. As a result we had a very high and expensive labor turnover.

Today, the Lehigh Valley maintains an employment bureau whose duty it is to see that the best men available are furnished; it also provides for a physical examination of employees to determine that they are physically able to handle the work assigned to them, maintains relief associations to extend financial relief in case of sickness or injury, and building and loan associations for investing surplus funds where they will draw more interest than that given by banks on savings accounts, provides group insurance which gives standard life and accident insurance to employees at low cost and a pension system which insures an aged employee at least a small income after his active working days are over. In the interest of the employees of the entire road these enterprises are supplemented by social organizations, bands and orchestras, baseball, football, basket ball and bowling teams and outings.

While these experiences have all contributed in producing the contrast which exists between the store department conditions now and earlier, they are apart from various measures which are practiced within the stores organization itself. These practices and the experiences from their use are as follows:

The general storekeeper has a staff meeting of the traveling, district and division storekeepers at least once a month. Practically all of the standard practices, as set forth in the book of rules, are thoroughly discussed and decided upon at these meetings. Other subjects regularly listed for discussion are: material balances, cost of handling materials, payrolls, overtime payments, cost of handling scrap, reclamation, revision of forms, mechanical facilities for handling material or scrap, fire prevention, prompt and proper handling of cars, personal solicitation of freight and passenger business and discussions of articles in recent issues of trade or technical papers.

The meeting place is changed each month until all important storehouses have been visited. In this way each store officer is personally acquainted with every other store officer, becomes familiar with every storehouse layout on the road and often picks up ideas that can be taken home and worked out to advantage in his own store. His knowledge is no longer limited to his own immediate activity. Before each meeting a trip is made through the shop and storehouse properties and every operation observed and commented upon.

If the meeting place is in a town where some large manufacturing plant serving the road is located a visit is made to that plant after these meetings to learn more about some of the materials that are being handled in stock. Recently a large wire rope plant, a car wheel foundry and a brass foundry were visited, while after the next meeting it is planned to visit the plant of a pneumatic tool manufacturer.

It is the policy that every storekeeper, after he gets back on his own territory, should call a meeting of the supervisors in his own organization and outline to them briefly the proceedings of the system staff meeting so that every supervisory unit will be well informed as to any changes in rules, regulations and methods of operation. The foreman, as the direct point of contact, should then make it his duty to see that the workingmen under his jurisdiction fully understand these changes and know why they were made and what they are expected to accomplish. The general storekeeper should make it a point to attend these meetings as often as possible and personally meet and talk to the men in his organization who are actually doing the work.

Store Officers Attend Division Meetings

The division and district store officers, although reporting direct to the general storekeeper, are considered members of the division superintendent's staff and attend all meetings of the division staff, safety and fire prevention committees. In this way they are kept well posted on all matters of interest in all departments and because of the knowledge obtained of work planned, can better anticipate their material requirements.

All store officers are also considered members of the master mechanic's or shop superintendent's staff and attend all meetings of the shop foreman. By so doing they are in close touch with all phases of the work in the mechanical department and know what locomotives are coming in for repairs, what classes of cars are scheduled for repairing, what work is liable to be delayed because of lack of material, what materials are not giving complete satisfaction, or probable changes in specifications or patterns, all of which is of great value in planning for material requirements.

Every store officer is also requested to visit all shops in his immediate vicinity and interview each foreman every day so as to keep fully informed on the material situation from a mechanical department standpoint.

Spokesmen of Users at Annual Meetings

Once a year an annual business meeting and banquet is held to which all employees of the stores department and representatives from every other department, and also stores department representatives from three or four neighboring roads are invited. At the afternoon business meeting papers relating to stores department work are read by employees and talks given by officers from other departments. At the last meeting the vice-president and comptroller, purchasing agent, superintendent of transportation, chief of insurance bureau, engineer of tests and

* Abstract of a paper presented before the annual convention of Division VI. Purchases and Stores, American Railway Association, at St. Louis, Mo., on May 20, 1925.

supervisor of employment participated in the meetings.

In the evening at the annual banquet short talks are made by the general storekeeper, several division superintendents, shop superintendents, master mechanics and guests from other roads. These meetings create a closer and better feeling among the men and between the men and the management which, in turn, brings about better operating results. At the first banquet in 1922, 43 were present, at the second in 1923, 85, at the third in 1924, 140, while at the most recent one, there were 216 present.

Incident to the personnel work, the effort is made to impress upon each workman that his ultimate welfare depends upon the success of the railroad and to make him a booster for the company in all of his public relations as well as personally to solicit freight and passenger patronage from his friends, the merchants with whom he does business and the organizations to which he belongs. The results obtained along this line have exceeded expectations.

All railroad employees are interested in the basic facts connected with their work and insofar as they are interested, these facts should be made available to them. The constant contact between our employees and the public makes such education extremely valuable. To accomplish this we must break down the old dividing line between information that might be of value to officers and that which would be of interest to the great body of employees. Practically all of the operating statistics which pass over the desk of the general storekeeper can safely be passed down to the store officers at staff meetings and by receiving it regularly they will have a better working knowledge of the railroad as a whole.

The problem of presenting other available data to the supervisory units and workmen is solved by discussions at store staff meetings, by the railroad technical press and by means of the bulletin board. The general storekeeper subscribes for railway publications which are carefully looked over, and articles of interest red-pencilled and sent "down the line" for the attention of supervisory employees. Bulletin boards of a standard type are provided and located in convenient and conspicuous places. These boards are currently utilized to convey messages of interest. The endeavor is made to present matters of an educational nature in neat poster form every 30 or 60 days.

The final point to be mentioned in outlining personnel practices in the stores department of the Lehigh Valley is probably the most important, inasmuch as the best productive results can be obtained only when the interest and co-operation of the men who perform the work are secured. On the theory that the reception, education and training which employees receive in the first six months or year of service greatly affect their future usefulness and loyalty to the industry, it is the practice after an applicant for a position in the stores department has been investigated and accepted by the supervisor of employment and passed the necessary physical examination before a company surgeon and is ready to start on his new work, to bring him before the store officer who briefly outlines the company's rules and regulations and methods of operation, the functions of the stores department and the worker's particular place in the general scheme of things. He is then turned over to the foreman in charge of the work to which he is assigned and, by him, shown all around the storehouse property and introduced to every other workman on the job and clearly told just what is expected of him. After such an introduction to his work and his fellow workers any worthwhile employee should feel at home and have an active interest in his work. The interest of the store officer and the foreman in the individual employee and his work is maintained at all times in practically the same manner that the general storekeeper follows up the work of the individual store officer. There are many details connected with this phase of human relationship. One little practice that has brought forth considerable favorable comment from the men is the sending of a greeting by the general storekeeper to each supervisory employee at their birthdays and at Christmas time.

We are just putting into effect at our largest store the bonus system for stockkeepers. If it proves satisfactory the practice will be extended to other points. The Lehigh Valley does not coddle its store employees, but endeavors simply to give them a "square deal" in every sense of the word which is all that any workman wants.

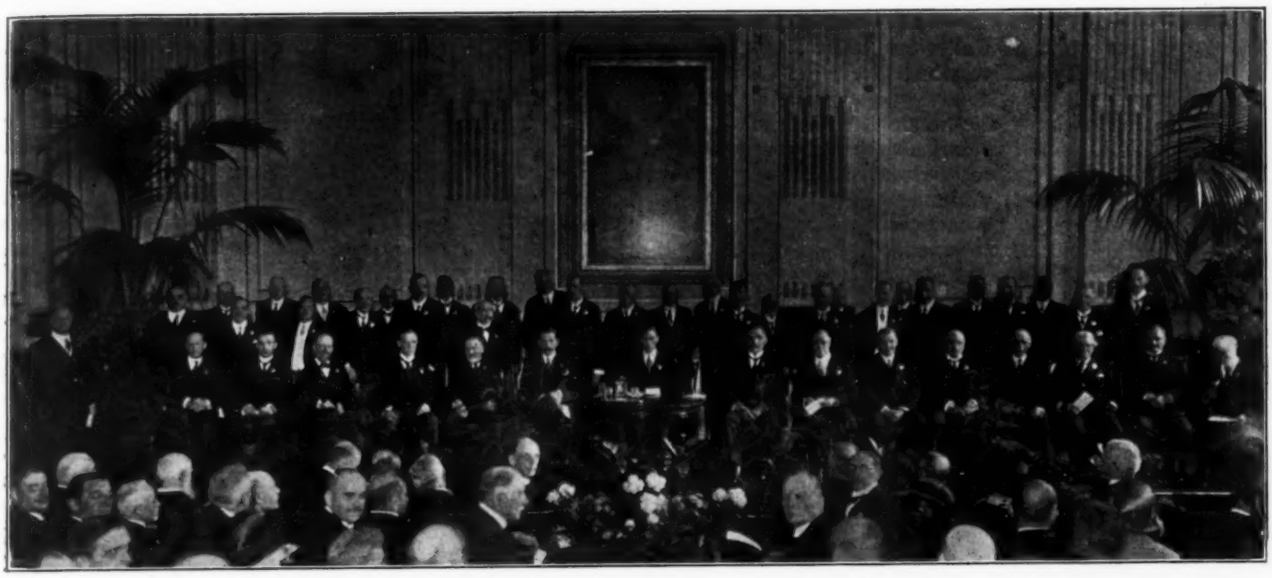
Roads Ask Reargument on Six Months Guaranty

WASHINGTON, D. C.

BOTH the Great Northern and the Northern Pacific, which Division 4 of the Interstate Commerce Commission has held were overpaid in the advance and partial payments on account of the guaranty for the six months following the termination of federal control, provided in section 209 of the interstate commerce act, have filed petitions asking for a reargument before the entire commission regarding the settlements made. Both roads claim that, instead of being required to make refunds to the government, they have not received the full amount to which they were entitled.

The Great Northern petition say that on March 1, 1921, the carrier's claim for $18,498,392 being pending, the commission found a probable allowance of $15,705,688 and issued a certificate for $6,000,000, which, with sums previously certified in the amount of $6,500,000, produced total payments to the amount of $12,500,000. There has been no statement of any error in this previous finding, the petition asserts, and no explanation of the tremendous reduction made, reducing the previous computation of $15,705,688 to $11,071,769, on the basis of which the road is now asked to refund an overpayment. The company contends that the original finding was approximately correct and that a final certificate should be issued showing that not less than $2,500,000 is still due the carrier. Among the numerous points on which the company objects to the finding of Division 4 it is stated that whereas the actual maintenance expenses during the guaranty period were $29,430,443 the commission had computed as constructive maintenance only $23,815,720.

The Northern Pacific petition says that on August 14, 1920, the commission certified a payment of $5,000,000, on March 3, 1921, one for $7,000,000, and later some smaller payments to subsidiaries making a total of $12-175,000 of advance and partial payments. On June 17, 1925, Division 4 issued a report placing the amount of the guaranty at $10,905,094 and stating that the road had been overpaid by $1,269,905. The company contends that $12,645,625 was necessary to make good the guaranty and that a final certificate for $470,625 should now be issued. Among the items the full commission is asked to consider are the carrier's claims for $144,673 for depreciation on equipment acquired since 1917, $1,307,140 for difference in the use of freight cars, and $288,716 accounting exceptions. It is also stated that the certificate of March 3, 1921, said the commission had "definitely ascertained" that $7,000,000 was then due and that the law confers no authority to make a tentative determination subject to subsequent alteration.



Opening Session of the Congress With H. R. H. the Duke of York in the Chair With Members of the Permanent Commission on Either Side of Him

International Railway Congress

Eight-hour day and safety at grade crossings among important topics discussed at early sessions

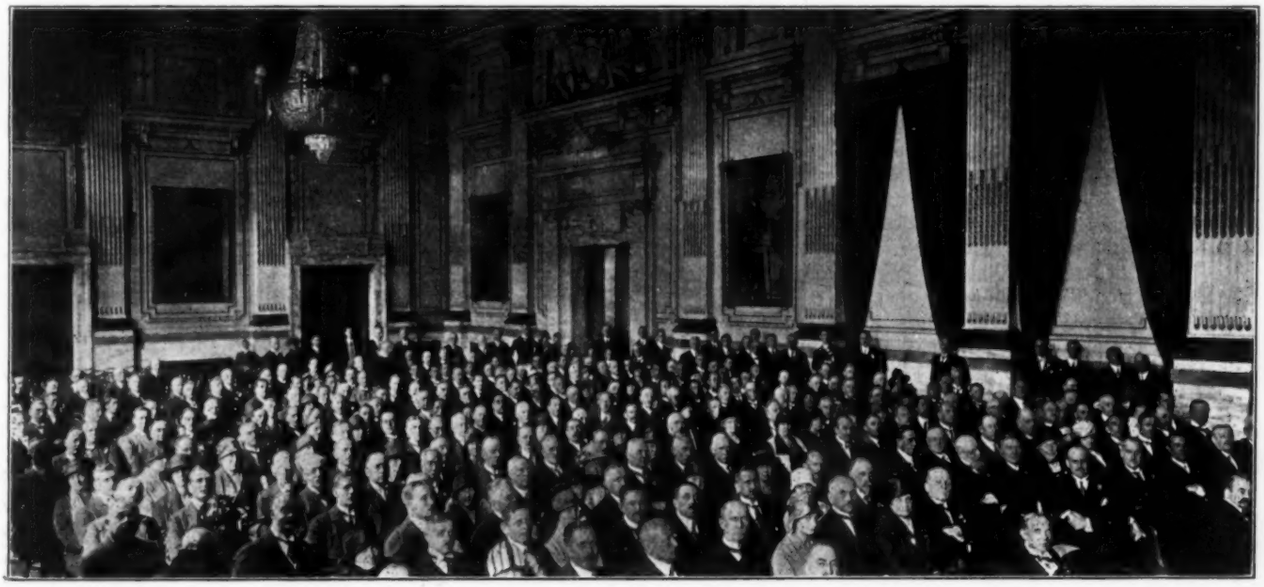
By Samuel O. Dunn

Editor of *The Railway Age*

THE tenth session of the International Railway Congress began in London on June 22 and was concluded on July 2. There were in attendance about 900 delegates representing governments, railway associations and individual railways throughout the world.

The opening of the meeting on the afternoon of June 22 was presided over by the Duke of York, who stated that he declared the Congress open on behalf of his brother, the Prince of Wales, the President of the Congress, and also spoke "in the name of the King, who takes the greatest interest in your visit and the object for which it has been arranged."

"This is an historic occasion," said the Duke of York. "One hundred years ago the first railway in the world—



Opening Session of Congress from Speakers' Dais

the Stockton and Darlington—was opened in this country. On the badges which you all wear you will see a representation of the locomotive which drew the train on the opening day.

"To England belongs the honor of setting an example of progress which other countries were not slow to follow. The development of railway systems in Europe and the opening up of the vast American continent by railway enterprise are among the wonders of history. In addition to delegates from these continents, we are glad to welcome here today representatives of countries whose railways were in their infancy when my grandfather, the late King Edward, opened the Fifth Session of this Congress.

"Such conferences as these, having for their object the propagation of knowledge and exchange of experience, play an important part in the progress of the world. The practical advantages to be derived from the interchange of ideas which these discussions promote must be enormous, but as the success of such meetings depends to a very large extent upon the mutual confidence and goodwill of those who take part, another aspect of their utility is brought into prominence. They provide an opportunity for representatives of every nation to meet on a common ground, to get to know each other better, and to appreciate each other's point of view."

Monsieur Foulon Responds

The response to the address of the Duke of York was made by Monsieur E. Foulon, president of the Permanent Commission of the Congress, who is general managing director of the State Railways of Belgium. M. Foulon recalled that at the conclusion of the session of the Congress in Rome three years ago it was decided to hold the next session at Madrid, Spain, in 1927, but that this plan was changed in accordance with the expression of a wish by British railway officers that a session to be held in London in 1925 to coincide with the celebration of the centenary of the opening of the first railway line in the world for public traffic, the reference being to the Stockton & Darlington.

In consequence the holding of the session in Spain had been postponed until 1930.

"The invention which we owe to the genius of George Stevenson," said M. Foulon, "is, of all those which have been introduced into the world, the one which has had the greatest influence upon the lives of nations and upon the development of civilization.

"The inauguration in 1825 of the Stockton & Darlington line indicated the starting-point of a far-reaching evolution in the means of production and distribution, and also in international relations.

"With stupendous rapidity the whole surface of the globe was opened up by 'Iron Roads'; today those lines total 760,000 miles, and we have witnessed a progressive development of railways in respect of traction, acceleration and security of transport.

"The International Railway Association, founded in 1885, has existed now for forty years.

"It brings into close relations the railway experts of the whole world, and its periodical conferences, by the opportunities which they give for comparing the results of experience and the exchange of observations made upon every type of system, promote continuous progress, both in the technical and administrative departments."

M. Foulon praised the local organization committee which under the chairmanship of Viscount Churchill had made the arrangements for the Congress in London. His praise was well deserved, for the local committee, consisting of British railway officers, performed in a most satisfactory way the work of making arrangements for the accommodation of the Congress and for the entertainment of delegates and their families incidental to it.

Lord Churchill Made President

Other addresses were made at the opening session by Colonel Wilfrid Ashley, the British Minister of Transport, and Lord Churchill, who is chairman of the Great Western Railway of England. Colonel Ashley mentioned that the Congress has grown until now it has a membership of 235 administrations, representing 300,000 miles of line. Lord Churchill was made president of the Tenth Session and M. Ghilain, engineer-in-chief of the Belgian State Railways, and Sir Henry Fowler, deputy chief mechanical engineer of the London, Midland & Scottish Railway, were made general secretaries.

Viscount Churchill, in taking the chair, said:

"I do not wish to burden you by quoting figures to show the extent to which railways throughout the world have grown since the opening, in the year 1825, of those 30 miles of line between Stockton and Darlington. I would rather ask you to compare the conditions of things in general—and transport conditions in particular—a hundred years ago with those which exist today. Never in history has there been such a change in so short a period.

"The advent and development of the railway has made possible the closer intercourse of all mankind; it has opened the markets of the world to the industrial nations and at the same time has enlarged the area from which those nations draw their supplies and increased the varieties of materials available to them; it has, in fact, revolutionized the whole of our lives. Except in a very hazy sort of way, it is difficult to realize the state of affairs prior to the introduction of the iron road with which we here today are all so closely associated, and the development of which we trust is for universal good."

Following Lord Churchill's address, the general meeting adjourned and on the following morning the Congress began its work in the five sections into which it is divided.

Americans Honored

The Congress was attended by 35 delegates representing the United States government, the American Railway Association and individual United States railways. The names of all these heretofore have been given in the *Railway Age*.

Dr. J. H. Parmelee, director of the Bureau of Railway Economics, was made president of Section IV—General, and Rollin H. Wilbur, vice-president and general manager of the Lehigh & New England Railroad, was made a vice-president of this section. G. A. Harwood, vice-president of the New York Central, was made a vice-president of Section I, which deals with "Ways and Works," and J. W. Roberts, general superintendent transportation, Eastern Region, Pennsylvania Railroad, was made a vice-president of Section III, which deals with transportation.

From the standpoint of English-speaking delegates the proceedings were much more satisfactory than at the Rome Congress three years ago. The rule is that each session of the Congress shall have two official languages. One of these is French and the other the language of the country in which the session is held. In consequence in each section there were provided interpreters to render into both French and English everything that was said. Furthermore, because the Congress was held in England there were in attendance a larger number of English-speaking persons than was the case at Rome, and the American delegates, practically all of whom understood no language but English, were much better able to follow

the proceedings and participate in them; and the same thing was true to a great extent of the delegates from other English-speaking countries.

The Eight-Hour Day

The reports and discussions made clear that the railways of all countries are confronted with much the same problems of management and operation, although, owing to differing conditions, they take somewhat different forms in different countries. For example, one of the subjects set down for consideration in the General section, of which Dr. Parmelee was president, was the eight-hour day. During or immediately following the war many of the railways of the world were confronted with the necessity of reducing the working hours of employees, and of recognizing the principle of the eight-hour day. Reports and discussions showed that while operating conditions vary widely in different countries, the railways in all of them are confronted with difficulties in respect to the eight-hour day, and particularly, of course, in train service. Dr. Parmelee presented a report regarding the eight-hour day in the United States. He called attention to the fact that a clear distinction must be made between the train and engine forces, on the one hand, and the shop, maintenance-of-way and clerical forces, on the other hand. He recalled the passing of the Adamson Act and said: "While some trains have been speeded up, the location of terminals and the density of traffic have made it impracticable to do so in all cases, and the law has increased the cost of train operation in the neighborhood of $100,000,000 per year. In brief, the employees secured under this law what they really sought, not so much a reduction in hours of work as an increase in rate."

He recalled that after the war the principle of an eight-hour day for employees not engaged in train service has been generally recognized in the United States. He summarized the results by comparing certain statistics for the year 1916 with corresponding statistics for the year 1924. His summary of the results was as follows:

"From the employees' point of view:

Hours per week have been reduced from 60.6 hours in 1916 to 48.3 hours in 1924. The 48-hour week has been, in effect, realized.

Compensation per hour has increased 126 per cent.

Annual compensation, or earnings, have increased 81 per cent. In this connection, it will be recalled that the cost of living has increased about 65 per cent.

These averages apply to all railway employees, and indicate a satisfactory situation from their point of view. With fewer hours of labor, their total earnings per man have increased at a greater rate than the cost of living.

Banquet at Crystal Palace, London, Given by the Railway Companies' Association of Great Britain on June 25

"From the point of view of railway managements:

The number of employees on the pay-roll increased at a slightly higher rate than the traffic handled. From 1916 to 1924, the number of employees increased about 7 per cent, and the freight and passenger traffic about 5 per cent.

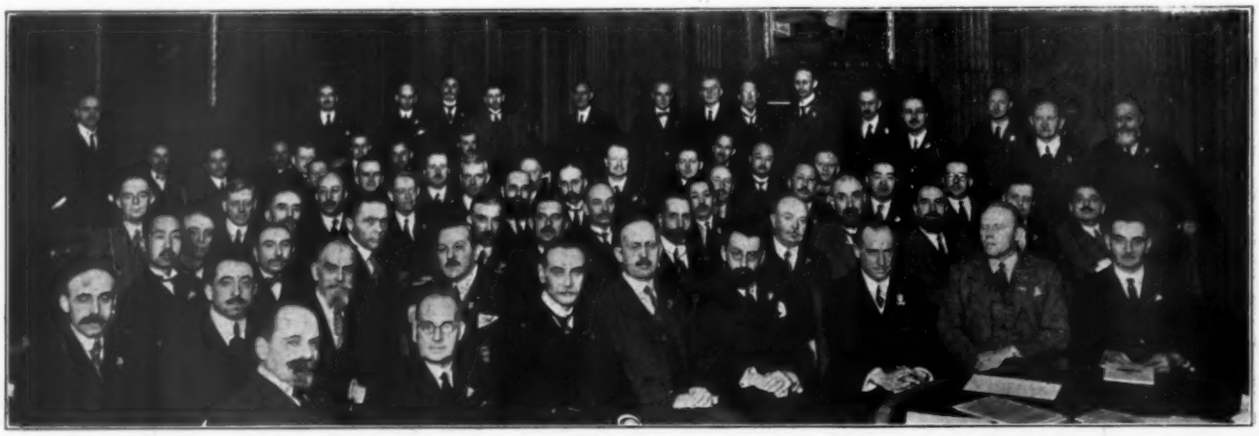
The larger traffic was handled with a considerable reduction in hours, indicating that more traffic per hour was handled in 1924 than in 1916. This result was attained largely by increasing the size of engines and cars, and by loading trains and cars more heavily.

Although fewer hours were paid for in 1924 than in 1916, the rate per hour was 126 per cent greater in 1924 than in 1916, and the total amount paid in wages was nearly 100 per cent greater."

In Great Britain the eight-hour day became operative on

February 1, 1919; in America on January 1, 1917, and generally on October 1, 1918; and in the Dominion of Canada in 1917. In South Africa it was adopted in 1919, but was abandoned as from September 12, 1921, when conditions as prior to December, 1919, involving hours of from 8 to 12 (according to grade), were reinstated. In South Australia some grades have the eight-hour day, others work up to 9½ hours; though the tendency is to shorten the working day. In Western Australia the eight-hour day is practically universal. In New South Wales working hours (96, 102, 108, 112, 120 for specified grades) are fixed on a fortnightly basis. On the Commonwealth railways the weekly total is fixed at 48, but not with a definite limit of eight per day. The eight-hour day is usual in Tasmania, but does not apply to certain grades and where hours are fixed by the train service. Here also hours are reckoned on a fortnightly basis. In New Zealand, after reducing hours to 44 per week, they have been raised to 48 for some grades. Eight and 10 hours are worked in the Malay Peninsula. In Ceylon some grades only have the 48-hour week. In Nigeria grades other than those in the traffic department have the eight-hour day. In India, Newfoundland, Cyprus, Hong Kong and Mauritius, no class of railwayman has the eight-hour day.

A marked difference of opinion was developed between the French delegates, on the one side, and the British and American delegates, on the other, regarding the terms in which the Congress should declare itself regarding the eight-hour day. It was agreed that in train service a rigid eight-hour day is impracticable, but the French delegates favored a declaration to the effect that employees should work an average of eight hours a day in periods of a week or more. The British and American delegates were opposed to this, because apparently it would commit the Congress to a declaration that the working time of employees even in train service should be restricted to a maximum average of eight hours a day. A resolution finally was adopted to the effect that a rigid eight-hour day is inapplicable to railway service, it being necessary that the hours employees are required to work shall be adapted to the local conditions.



Session of Section IV—General

Safety at Grade Crossings

The problem of preventing accidents at highway grade crossings is especially acute in the United States, where there are about 260,000 such crossings and about 15,000,000 automobiles. This problem is not presented in the United States alone, however. The question of dispensing with gate keeping at grade crossings was discussed in four reports presented at the Congress, one of these being by G. J. Ray, Chief engineer of the Delaware, Lackawanna & Western. It appeared from the reports that there is a growing tendency on important lines in most countries to dispense with gate keepers at highway crossings and to adopt other means for their protection.

In a summary of all reports on this subject which was presented at the Congress it was stated that:

"This tendency is justified not only by the economical necessities resulting from the great war, but also by the evolution of road traffic. As regards this, Mr. Ray points out that the old regulations applied to road traffic which was comparatively slow and crossed lines over which fast trains ran. Today, when automobiles vie with trains in speed, precautions which formerly were thought to be sufficient are no longer so. Barriers which effectively protected the tracks are often knocked down by motor vehicles, and it is not a rare occurrence for the latter to run into a train when passing a level crossing. For this reason, in the United States, where there are no less than 256,000 of these crossings on first class lines, and 15 millions of motor vehicles on the road, it is generally acknowledged today—not only by the high railway officials, but also by the public authorities—that a good automatic system of warning signals, acting day and night, gives much greater security—except perhaps where the traffic is very dense, or in the streets of towns—than the protection that could be given during a part of the day by gate keepers or watchmen. Many clear thinking minds therefore consider that it would be an improvement to make the users of the road responsible for the safety at level crossings, rather than an attendant. When this idea has entered into the public mind, an immense forward step will have been taken, and the question of dispensing with gate keeping at level crossings will have been solved."

Conclusions of the reports were summarized, in part, as follows:

"Even in those cases where the visibility of trains as seen from the road is insufficient, abolition of gate keeping may take place without inconvenience, on condition that automatic apparatus announcing the approach of trains is placed near the crossings.

"A good automatic warning signal working at all hours of the day and night offers a much greater guarantee of safety at nearly all level crossings than the protection given by gate keepers or attendants during a part of the day only.

"Automatic signals that announce the approach of trains should, if the apparatus fails or gets out of order, show to road vehicles a danger signal both day and night.

"Audible warning signals are not so serviceable as luminous signals, and are only justified at isolated crossings of small importance.

"The general use of red lights in streets and as rear signals on automobiles should be prohibited. Such lights should only be used on roads at points where there is real danger, such as level crossings."

Mechanical Devices for Maintenance Work

In the discussion of maintenance of track in the "Ways and Works" section there was a good deal said about the use of mechanical devices for doing maintenance work. In a summary of all reports upon this subject presented, it was said:

"We must call attention to the great development of mechanical processes in maintenance work in the United States, where such processes have been found advantageous both technically and economically. Europe is much less advanced in this direction, the obstacles encountered being largely of an economic nature. In Italy, however, the smaller forms of mechanical equipment appear to be in general use, and other countries are considering the possibility of adopting mechanical processes, especially in the case of electrified lines.

"There is therefore no lack of mechanical equipment, but nevertheless, except in the cases to which we have referred above in connection with tamping and the lifting of rails by means of jacks, such mechanical equipment is not very widely used in Europe for ordinary maintenance work. The reports for the British Empire, France and the other countries agree in attributing this to economic reasons, the time when such apparatus can be employed being too short, and it being difficult to effect an organization which gives perfect balance between manual labor and mechanical work."

Signals

Sections 2 (Locomotives and Rolling Stock) and 3 (Working) considered jointly the subject of fixed signals. The following conclusions were adopted by these sections:

"When three-position signals are used, the movable arms should give the three following indications: 'Stop,' 'Caution,' and 'Clear.' Other indications as to speed should be given by the relative positions of two three-position arms.

"The most suitable lights corresponding with the three positions of the arm are red for 'Stop,' yellow for 'Caution' and green for 'All Clear.'

"Whatever method of signally is adopted, when the warning signals, although they may be erected at well-chosen spots, are not sufficiently visible or are placed in neighborhoods exposed to the possibility of fog, it is advisable to give warning of their nearness by using definite marks such as the white boards or diagonal stripes on the posts before the signals, etc., so that the installation of a second warning by acoustic signals, fog signals, or luminous repeating signals, may be avoided as far as possible.

"If suitable current is available, it might be advisable to substitute electric lighting gradually for the mineral oil lamps almost universally in use; the technical measures on the system which have adopted this method of lighting are in general that in case of the lamp being extinguished, a stand-by and as far as possible a system of control shall be in operation.

"The gradual application of the automatic block compatible with local conditions, utilizing the system which is most suitably combined in certain places with luminous signals, is recommended."

The following text was adopted:

"The Sections note that certain lines work successfully, lines with very heavy and with mixed traffic by using only 'stop' and 'caution' signals with two positions. Others prefer three-position semaphores and yet others consider a fourth position indispensable. In these circumstances the Sections consider that signalling systems should be further examined and experimented with in accordance with the ideas of each line, and that it would be advisable to put this question on the Agenda of the next Congress, so that each country may profit by the experience and the

Session of Section I—Way and Works

results which will be obtained during the coming five years."

Statistics

Some interesting reports were received regarding statistics, one of which was prepared by Colonel Loree, vice-president and general manager of the Delaware & Hudson. It was developed that there is much diversity in the statistics compiled by the railways of different countries. Dr. Parmelee summarized the discussion as showing "it is generally agreed that without proper statistical information compiled promptly for the use of railway operating officials, they are unable to ascertain where and how increased efficiency and economy in operation may be effected."

Fuel and Its Combustion

"Fuel and Its Combustion" were discussed under the general heading of "Reduction of the Cost of Traction." Reports were prepared by G. H. Emerson, chief of motive power and equipment of the Baltimore & Ohio; for the British Empire by C. B. Collett, chief mechanical engineer of the Great Western Railway, and for other countries by H. P. Chenu, of the Belgian State Railways.

The summary of the reports prepared by Mr. Emerson stated that locomotive fuel is usually chosen on the basis of (*a*) availability in adequate quantity and (*b*) total cost per unit of traction produced. On these grounds bituminous coal is the generally used locomotive fuel, being widely distributed and marketed at lowest cost. Practically the sole exception is fuel oil produced in ample quantity in a few parts of the country remote from producing coal centers. The abundance of high rank coal and the comparatively favorable cost of its production and distribution have forestalled the production and use of processed fuel, briquettes, peat, lignite or the mixing of coals.

Pulverized fuel has not been found practical for locomotive use because of the limited combustion space available in the locomotive firebox of conventional design. There are many advantages resulting from the use of oil fuel where the comparative cost of the fuel permits, among which may be emphasized the reduced consumption of stand-by or terminal fuel, lower labor cost of hostling, easier control in firing to avoid waste, and greater convenience of storing and disbursing to locomotives. Colloidal fuel is still in the experimental stage.

The practice of using cross-rocking grates (axis extending across firebox) is practically universal in North America. A small number of roads use all finger grates and a few all table grates, but it is usual that some locomotives, the older designs, are equipped with finger grates and some, the modern designs, with table grates. Locomotives equipped with mechanical stokers are usually equipped with table grates.

The factors in the reduction of the visible products of combustion in the order of relative importance are design and maintenance of the locomotive, character and grade of fuel, operation of the locomotives by engineers and firemen, appliances such as brick arches for promoting good combustion, and appliances, such as steam and air jets, for promoting combustion and modifying the appearance of the emission from the stack.

Pulverized and colloidal fuels have only been used experimentally. Neither is a commercial proposition when compared with coal at prevailing prices. The deposit in the smokebox with pulverized fuel approximates 7 per cent with an equal quantity emitted from chimney in a semi-burnt condition. Briquettes have only been used during periods of labor trouble, causing shortage in coal supply.

Speaking on the use of mechanical stokers in the U. S. A., D. F. Crawford said that there are 8,000 in use, representing 15 per cent. of all the locomotives in the United States and 90 per cent. of the locomotives of 60,000 lb. tractive effort and over. Engines having 45 square feet grate area and upwards are generally fitted. The results obtained have been satisfactory. The reason for fitting the stoker was the demand for a second fireman on the larger locomotives. The mechanical stoker is found to give a higher temperature in the firebox than hand firing. Further, engines can be worked over two or even three divisions without cleaning the fires. Stoker-fitted engines can handle trains of 10 to 15 per cent. increased weight.

In reply to questions, Mr. Crawford said that there were economies with the mechanical stoker owing to better firing, and that the superheat was increased and the smoke reduced. In reply to H. N. Gresley, chief mechanical engineer, London & North Eastern, as to the maximum pounds of coal per hour that could be fired by hand, he said that the rate was 4,000 lb. per hour and 3,000 lb. in the Southwestern States. Above these figures the mechanical stoker was used to avoid a second fireman.

Rail Breakage

Reports on the Breaking of the Rails were made by W. C. Cushing, Pennsylvania Railroad; C. J. Brown, London & North Eastern Railway; M. Merklen, Alsace-Lorraine Railway; M. Cambournac, Northern Railway of France, and M. J. Willem, Belgian State Railways.

In the summary of the reports prepared by M. Merklen it was stated:

"From the vast amount of research work which has been carried out on this subject, the railway companies agree as to the causes already described long ago by Messrs. Cushing, Jennet and Frémont. These are piping segregation and brittleness, because the secondary causes which result from the use of the rails would not have any detrimental effect, if rail metal were homogeneous and not brittle.

"There is, however, a defect of which the initial cause is still obscure. These are transversal fissures in the inside of the section of the rail generally in the head, also called bright oval spots. This defect is probably due to faulty rolling, but research on this should be continued.

"To overcome all these defects, and thus eliminate the greater part, if not all the breakages, it is desirable to obtain from the steel works the manufacture of homogeneous and non-brittle rail metal.

"With this object, specifications have become more exacting; notably in France, impact tests from rails taken from the head of the ingot have been adopted; in England and America very carefully drawn up specifications have facilitated progress; but, as Mr. Cushing states in his able paper, 'it is still imperative to make radical progress, and 25 years' work spent in improving specifications have not brought about the desired results.'

"Engineers have not confined themselves to the introduction of more and more stringent conditions in their specifications; specialists have studied the remedies for the imperfections of manufacture; particularly in the United States, co-operation has been established between the railway companies and the steel manufacturers, and it has been found, according to Mr. Cushing, that it is advisable to increase the activity of these joint researches, which have been already carried on for many years to the mutual advantage of both parties.

"Among the latest processes tried, but not yet perfected, are:

(1) Pouring ingots into inverted mold with bottom

runners to avoid piping, and excessive segregation.

(2) Heat-treatment of the rails, to obtain a non-brittle metal.

"It would appear that when the application of these two processes is brought to perfection, the steel manufacturers will be able to produce a carbon steel, without segregation and non-brittle, adequate to eliminate breakage, especially small cracks in the running surface of the rail, and even at the joints.

"In conclusion, we should draw attention to that part of Mr. Cushing's paper relating to the inclination of rails; after having said that it is impossible to come to the conclusion that any particular system of laying has a favorable or unfavorable effect on the number of defects or breakages of rails, our able colleague develops his opinion on the very controversial question of the position of rails, whether they should be inclined or vertical; it appears that he favors the vertical position, since he refutes, point by point, the ten principal objections which have been raised against this method of laying rails by those who favor the inclined position.

" 'The examination of the information regarding rail breakages supplied by the various companies has been made difficult, and comparisons impossible from the fact that the different companies all keep their statistics in a different manner.'

"From this point of view, it appears desirable to adopt uniform rules.

"It appears desirable that the companies should take the necessary steps, either with their own resources, or in collaboration with the steel manufacturers, to investigate the initial causes of rail breakages.

"It would be particularly advisable to study transverse fissure breaks in the interior of the metal, a defect sometimes described as 'bright oval spot,' and the initial cause of which is still unknown.

"The segregation found in the metal of most broken rails seems to be the most frequent initial cause of the observed failures.

"The attention of metallurgists should, therefore, be called to the necessity of continuing their endeavors to completely eliminate segregation of the metal, and, if necessary, to guard against it by suitable clauses in the specifications.

"Microscopic tests are to assist the study of segregation; it would be advisable to extend the use of these tests, and to perfect them in such a manner as to make them practical for the inspection and acceptance of rails. The foregoing also applies to impact tests.

"The heat-treatment of rails seems to improve the quality of the metal, and to reduce its brittleness. It would be interesting to follow up the heat-treatment experiments of rails which have given satisfactory results in U. S. A. and France.

"Among the secondary causes of rail breakages should be included:

"Shocks occurring at joints due to the rolling loads.

"From this point of view,

"(*a*) The length of the rail should be increased so as to reduce the number of joints.

"(*b*) The layout of joints should be improved, so as to reduce the shock of impact due to wheels passing over them.

"It is possible to overcome, to a certain extent, rail breakages by carefully maintaining the track, exercising the greatest care over the material used in the track, and careful supervision, which will allow the removal from service of rails, as soon as defects which are likely to develop into fractures make themselves apparent.

"The most important secondary cause of rail breakages is due to the constitution or the maintenance of the rail joints.

"After having pointed out that on the New York Central, the proportion of failures within the fishplate zone is very small (one defect within the fishplate zone to thirty outside this zone), Mr. Cushing draws attention to the fact that this low proportion is attributable to the use of fishplates 38 in. long (965 mm.) resting on three sleepers (ties), one of which is under the joint.

"This may induce railway companies to return to the system of supported joints. Joints, as at present used, are the weakest portion of the track, and therefore researches should be made in order to better them, always keeping in mind that their constituent parts should be few and simple as possible, and that they should be cheap to instal and economic in upkeep.

"It would be worth while carrying out simultaneously on all systems experiments on a certain number of types of rail joints which appear to give greater satisfaction:

"(*a*) Bridged joints of which the rail ends rest on a metal plate forming a bridge between the adjacent sleepers.

"(*b*) Suspended joints, where the adjacent sleepers are brought together.

"(*c*) Joints having no holes in the web.

"The question of perfecting a type of rail joint having no holes is particularly drawn to the notice of the technical experts, as a matter of great interest; this would do away with a large proportion of the most frequent class of rail breakages.

"Means of preventing rail creep should be studied independently of the joints.

"The standard length of rails should be increased as much as possible, so as to reduce the number of joints.

"Annual greasing of fishplates is recommended. This should be done by undoing the joint, which enables an inspection to be made of the end of the rail and the fishplating.

"Metal free of segregation and other defects should be used for fishplates.

"Heat-treating of fishplates is recommended, since it does away with the abnormal brittleness occasionally met with.

"Remaking of fishplates by reforging is recommended for the sake of economy."

Dinner at Crystal Palace

One of the most interesting features of the Congress was the dinner given by the British railway companies at the Crystal Palace on the evening of June 25 to delegates and their families. Special trains were run from Victoria Station, and the dinner was attended by about 1,500 persons. The chairman was Sir Guy Granet, chairman of the London, Midland & Scottish Railway, the address proposing the toast "Our Guests" was made by Sir Philip Cunliffe-Lister, President of the British Board of Trade, and the response to this toast was made by Mons. C. Colson, vice-president of the Permanent Commission of the Congress. Following the dinner an extraordinary fireworks display was given to the guests.

It would be impossible to give too much credit to the local organization committee of the British railways for the admirable way in which everything connected with the dinner was handled. A resolution of thanks to Sir Guy Granet, the chairman, and other members of the local organization committee, was moved and enthusiastically adopted.

A further report regarding the congress will be published in a later issue.

Status of Oil-Engine Locomotives

Development of various types and future possibilities in railroad service discussed by engineering societies

AT a joint meeting of the local sections of the American Society of Mechanical Engineers the American Society of Refrigerating Engineers and the American Society of Marine Designers, held in New York on April 22, several papers were presented dealing with the subject of oil-engine locomotives with particular reference to the development of this type of motive power, the problems of power transmission and the possibilities for future application in railroad service.

Prepared papers were presented by E. B. Katte, chief engineer, electric traction, New York Central, L. G. Coleman, manager, locomotive department, Ingersoll-Rand Company, and by A. Schein, who read a paper prepared by E. A. Sperry, president, Sperry Gyroscope Company. W. B. Potter, chief engineer, railway department, General Electric Company, touched briefly on the developments of power transmission on oil-engine locomotives. One particularly significent remark by Mr. Potter was to the effect that this type of motive power should not be looked upon as a successor to either the present steam or electric locomotive, but that its application to the railroad field would in all probabilities be limited, for some time at least, to special classes of service determined by unusual economic conditions.

Abstracts of the papers presented by Messrs. Katte, Schein and Coleman follow.

Characteristics of the Oil Engine Locomotive

By E. B. Katte

Chief engineer, electric traction, New York Central

Railroad engineers have watched with much interest the development of the oil engine in the hopes that it will become available for locomotive use. Not a great deal has been accomplished as yet, either in this country or abroad, but there are good prospects that an oil-engine locomotive can be produced for successful switching service and for main line operation where traffic is light through residential districts. These two fields are, perhaps, the most promising at the present time for this type of locomotive.

The high tractive force at starting and through acceleration up to three or four miles an hour adapts the oil engine to switching service which involves many starts and short runs with rapid acceleration.

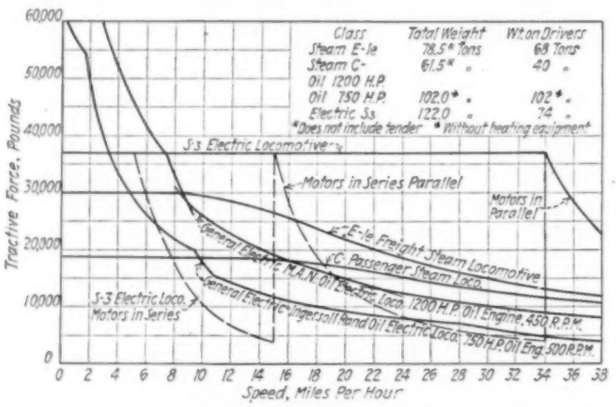
The comparative freedom from smoke makes the oil-engine locomotive acceptable to communities where the smoke and steam emitted from steam locomotives is objectionable.

The characteristic tractive force curve of the oil-engine locomotive is materially different from the tractive force curves of steam and electric locomotives, but in order to visualize these different tractive force speed curves of the three types of locomotives, they have been drawn to the same scale and are shown on the chart. The three locomotives are not very closely comparable nor have the tractive force-speed curves been drawn with any great degree of accuracy, but are presented merely to illustrate the characteristic differences of the three types.

In the case of the Diesel engine, the high tractive force at starting is due to the operation of the oil engine at constant speed and power, thus a relatively small oil engine might be suitable in a service which would require a steam locomotive of greater horsepower, but this characteristic at the same time limits the use of the oil-engine locomotive to relatively light trains if operated at high speeds.

In the case of the steam locomotive the tractive force is sustained over a greater range of speed due to the energy which is stored in the boiler and the variable steam cut-off in the cylinders. A larger steam engine is required for starting than is needed after the train has been accelerated.

In the electric locomotive, a high tractive force through a long range of speed is accomplished by connecting the motors, first in series, then in series-parallel, and finally in full parallel, and by constantly drawing upon the power station for the increasing electrical energy. This characteristic permits the economical use of relatively large motor horsepower.



Tractive Force-Speed Chart Comparing Steam, Electric and Oil-electric Locomotives

The two features of the oil-engine locomotive requiring immediate development are, first, the transmitting apparatus between the engine and the locomotive wheels. The electric drive is now in use on two of the best known oil-engine locomotives thus far produced. This drive is handicapped by its weight and high cost. Various types of mechanical and hydraulic drives are being tried out and some with good prospects of success, especially in the smaller sizes.

The second feature requiring further development is a means for re-cooling the jacket water for the cylinders. In marine engines and for stationary engines, there is, of course, no such problem, but the restricted space available for cooling apparatus on the locomotive makes this feature of new importance.

That there is a field for oil-engine locomotives in steam railroad service has long been recognized and railroad engineers are generally of the opinion that if such a locomotive can be produced at a reasonable cost, it will be economical for yard switching and for the interchange of freight cars between electrified and non-electrified yards; also, between railroad yards where different non-interchangeable systems of electrification have been installed. Further it is believed that the first cost of oil-

engine locomotive equipment, especially in yards, should be less than for electrification, and as economical in operation.

For main line use where the traffic is light and the trains are not heavy, and where the use of the steam locomotive has been restricted because of smoke and steam, it is not unlikely that the cost of oil-engine locomotive operation will be considerably less than either under steam or electric power.

It is for these reasons that encouragement has been given to the manufacturers of Diesel engines and the cooperation of the electric companies and the locomotive builders has been sought to the end that oil-engine locomotives, with either electric or mechanical drive may be developed, as promptly as possible. It is expected that during this year several locomotives, with oil engines of 800 to 2,000 h.p. will be constructed and put in experimental service on several railroads.

The Diesel-Hydraulic Locomotive

By E. A. Sperry
President, Sperry Gyroscope Company

The Diesel engine has come to stay in one great branch of transportation, namely, shipping. In 1912 only one motorship passed the Suez Canal; in 1923 there were 1,100. The power plant in the steamship is of moderately high efficiency; the same steam plant in a locomotive operates at extremely poor efficiencies. It is therefore inconceivable that rail transportation shall not also undertake to enjoy the same benefits of cheaper power production.

This is from the fact that locomotives are compelled to run non-condensing. The thermal efficiency of the ship is 12 per cent, that of the locomotive is on the order of 3 per cent. With the substitution of the Diesel on the locomotive we should expect an overall efficiency of about 26 per cent, making a saving in fuel in the ratio of 26 to 3 or about 9 to 1. It is difficult to get engineers interested in the application of an engine that has been noted for its great weight per horsepower. In undertaking to adapt the Diesel to heavy power locomotives two great problems arise. We first have to reduce the weight of the machine to a minimum and, secondly, the power and torque relation of the engine is such as to necessitate a power connection to the drivers possessing peculiar characteristics of very complete exchange of speed and torque.

As to the prime mover, to make this light each element should have a greater capacity for work. With combustion engines, three factors are important. First, if the mean effective pressures on the piston can be raised we can expect to make the piston smaller, bringing down the weight of many other parts correspondingly. Second, if more power can be obtained from the same weight or volume of air employed, then again smaller cylinders and lighter parts can be used. Third, if the necessity for super-compressed air can be eliminated, then the cumbersome three or four stage pump can be eliminated together with the weight and space it occupies.

It is believed that the compound oil engine affords easily the highest point touched under these three heads. Instead of the 70 lb. to 80 lb. per sq. in. net mean effective pressure, the compound engine easily delivers in the vicinity of 240 lb. and has been recently running at considerably higher values. Thus the compound has a great advantage over the ordinary engine. Furthermore, instead of an average of 3½ cu. ft. of air consumed by all kinds of engines per minimum for each brake horepower delivered, this engine is able to work on about 2.3 cu. ft. per min. with a colorless exhaust, indicating that less air than this will in all probability eventually be sufficient, but even this gain is so great as to give a very definite advantage in weight and space occupied. Again, no compound engine has ever been operated by other than solid injection. The two-stage compression gives the compound such an advantage—in large clearance volume reducing the chilled walls to an insignificant ratio to unit volume—that the widest possible range for solid injection is afforded and all the advantages of solid injection are thus rendered available.

One of the first schemes of using hydraulic means for driving was the Lentz transmission, using a pair of rotary pumps—one the driver, the other driven. For the first application the above may be considered to have performed very well, but the efficiencies obtained from the use of rotary pumps were far too low, and the upkeep much too high.

Only recently a step in the right direction on the Lentz transmission has been made in that the driving generator is of the piston type, so constructed as to enable the total displacement to be altered through change in the piston stroke. The motor, however, is still of the rotary vane type, resulting in a low overall efficiency. It is well known that the maximum dependable hydraulic efficiency is obtained from the reciprocating piston. Ultimate success will thus depend upon the application of the piston pump of the variable displacement and pressure type for the hydraulic drive.

There are two methods of power transmission now well advanced in application; one is the electric, the other the hydraulic. With the Diesel so well perfected, it is only a question of efficient application of its power at all times. In comparing the hydraulic and electric systems we may state the following:

First.—The hydraulic system is purely mechanical, is rather simple and light as compared with the electric, and is easily understood.

Second.—It is free from the dangerous and vital limitations of the electric in that it has no such element as the five-minute rate, the hour rate and the continuous rate there being no time limitation and no danger of appreciably increasing temperatures. All the ratings are continuous, standing out in contrast with the electric drive in this particular.

Third.—Just as a steam engine can be made vastly lighter than any electric motor for the same power, the hydraulic, which is nothing but an engine with cylinders, is much lighter than the electric, having the advantage over the steam engine of working exactly as the latter would, were it supplied with a variable pressure boiler. The actual pressures back of the hydraulic motors are varied through quite a wide range.

Fourth.—The hydraulic system being multi-cylinder, the tractive force is developed with a smoothness equal to electricity and entirely free from the maximum and minimum torque conditions and jerking of the steam locomotive.

Fifth.—The hydraulic drive is a constant-power drive, that is, by its use we are able to obtain super-tractive force roughly to one-third of the maximum speed of the locomotive, at which time the full power of the prime mover is reached. Thereafter the regular speed-tractive function of constant power is obtained, giving its maximum effect at all points on the curve.

Sixth.—It may be said that the hydraulic drive which is employed between the internal combustion engine, delivering constant torque, and the variable power and speed requirement of the locomotive yields very definite advantages as to its performance, reliability and lower cost of maintenance.

Seventh.—The hydraulic equipment is not subject to the sensitiveness to moisture and water. The hydraulic gear will run on submerged track, in emergencies, without suffering the slightest deterioration.

Starting and acceleration with the hydraulic gear are made with absolute smoothness. In case of failure of the brakes, the hydraulic gear may be used to stop the train.

With the Diesel locomotive the various functions are developed by separate units, in contrast with the steam locomotive. When repairs are necessary the whole steam locomotive must go into the shop for considerable stay, whereas with the Diesel the particular part that requires attention is simply removed and a spare part substituted, the locomotive soon being ready for service again.

Owing to the general characteristics of the unit system of construction of the locomotive, and from the reasons last above cited, together with greater possibilities of acceleration, it is believed that the general experience in saving in amount of equipment employed now realized with the electric locomotive can be better effected by Diesel locomotives.

The almost complete elimination of the necessity for stopping to take on fuel and water gives an added reason why Diesel locomotives may be depended on to give more service than steam.

In a general way we may consider the advantages of the Diesel drive, both hydraulic and electric, over the present system of electric operation employing the central station. First, we have an entire elimination of the enormous capital charges required for the power house, sub-stations, the high tension lines and the electrification of the road itself. It will do away with the all too numerous faults now prevalent in electrified freight yards, with constant danger to human life.

For service that demands frequent—in fact constant—running through the outer parts of a city, generally more or less residential, it eliminates the smoke and cinder nuisance. It is furthermore possible to obtain comparatively silent operation.

The Field for Internal Combustion Locomotives

By L. G. Coleman
Ingersoll-Rand Company

Most thoughtful railroad officers have been disturbed for some time by the steadily increasing cost of motive power. The rising cost of fuel has emphasized the low theoretical and still lower actual thermal efficiency of the steam locomotive. Efforts to increase it have materially raised the first cost both direct and indirect. The most serious effect is the decreased availability which affects all departments interested.

The locomotive problem is primarily one of operation, whereas it has usually received most attention as a mechanical one.

The true cost of motive power both capital and maintenance, is very obscure and, generally speaking, there are no current figures kept by railroads that show it in its true light. This is due to the diversity of accounts in which the various expenditures solely chargeable to locomotives are kept. For instance, on the capital side, the original cost of and improvements to shops, engine houses, water stations, etc., are lumped with other figures that have no direct bearing upon locomotive maintenance. Furthermore, the shop buildings themselves in many cases are used jointly for repairs to equipment other than locomotives, such as cars and maintenance of way apparatus.

The costs for locomotive repairs are lumped and it is difficult to ascertain the relative cost of maintenance of different types of locomotives. It appears, therefore, that before arriving at an accurate estimate of the relative economies of different types of power a different set of figures of locomotive costs is necessary. In the absence of such figures we have to fall back on common sense and experience and at best this is an uncertain procedure.

Speaking broadly, the aim of most railroads is to effect operating economy by increasing train loads which means greater capacity of locomotives which, in turn, requires heavier locomotives. In order to operate heavier locomotives there is usually required a heavier track structure. This expense is roughly, common to any type of power that may be decided upon, although owing to the continuous torque of electric locomotives it will probably be less expensive for them than reciprocating steam locomotives.

For steam locomotives, in addition to increased strength of track, however, the following expenses usually have to be faced: Longer stalls and pits in engine houses, longer turntables, larger coaling plans, larger cinder pits, heavier machinery in shops and engine houses, water stations of greater capacity, and larger stand pipes and water mains.

In the case of electric power none of the above additional expenses are required as, usually, the unit parts of electric locomotives are sufficiently small for existing machine tools to handle. There is, however, required the additional expense of overhead or third rail structure, substations and feeder lines, bonding the rails, and in some cases, changes in signal installation.

I presume it is unnecessary to go into the savings of fuel costs with the internal combustion locomotive which, granting its practicability, are assured.

One of the principal advantages of electric locomotives over steam locomotives, is their greater availability for service. It is, I believe, a generally accepted fact that steam locomotives, at the present time, are not made available for service for more than 45 per cent of the total elapsed hours in a period of considerable duration, and usually much less, whereas electric locomotives have shown an availability, during a number of years of operation, of over 80 per cent.

Not only is this total availability very much in favor of electric locomotives but they are capable of an intensive type of operation that steam locomotives will never reach and it is of perhaps more value to the railroads in time of peak traffic than the increased availability over the long period.

It is reasonable to expect that internal-combustion locomotives can be built with the same availability and characteristics of electric locomotives and, owing to their thermal efficiency their power costs will certainly be no greater; that they will not require the extra capital cost and maintenance, of the increased auxiliary facilities that steam locomotives require and, of course, will not require the auxiliary appliances necessary for electric locomotives. They will have the added advantage of being capable of operating over either steam or electric territory without additional facilities.

Internal-combustion locomotives, being wholly self contained, can be put to work and begin earning return on investment as soon as built and be adopted gradually as the means are at hand thus putting electrification within the reach of roads unable to face the first cost of complete electrification.

Therefore, it appears to me that the field for internal-combustion locomotives on the railroads is practically limited only by the ability of the internal-combustion engine builders to develop a machine with the reliability, economy and capacity of the electric locomotive and this does not seem an insurmountable problem.

Investigation of Body Icing of Perishables

I. C. C., in co-operation with Department of Agriculture, to study practice and effect in equipment

WASHINGTON, D. C.

THE Interstate Commerce Commission, through its Bureau of Service, in co-operation with the Department of Agriculture, is about ready to make an investigation with regard to body icing of perishables in transit. The main object of the investigation is to determine the value of, and necessity for body icing in the shipment of certain types of perishables, the effect of this practice on the equipment, and the means of obviating any deleterious effects on the equipment from such practice.

A conference was had at the office of the commission on June 30, at which were present representatives of the carriers, private car interests, and the shipping organizations. A tentative plan for the co-operative investigation was laid before the parties.

"It can generally be stated that no opposition was voiced by any of those present at the conference to the plan as outlined," the notice of the investigation said. "Arrangements will therefore be made to carry out this plan at the earliest practicable date, but it is expected that the investigations and tests to be made will consume more than one year. The tests are being made under the direct supervision of Commissioner McManamy, to whom the director of the Bureau of Service reports."

The body icing of certain perishable commodities, such as lettuce, broccoli and spinach, which are not injured by being shipped wet, has become rather common within the last few years and last year amounted to some 50,000 cars. By body icing is meant the refrigeration of the produce by placing ice in direct contact with lading.

In many parts of the United States, and particularly in the west, where commodities are shipped long distances to market and where it is important that they be cooled down as quickly as possible after they are harvested and enroute to market, this process is considered essential by the shippers. It is practiced on a large number of different types of vegetables, including lettuce, spinach, green corn, peas, celery, chickory, parsley, beets, carrots, cauliflower and radishes, all of which are shipped under body icing at certain times of the year. It is very similar to the practice of precooling as applied to fruits or vegetables which consists of the cooling down of a commodity to a refrigerating temperature, either before or immediately after it is placed in a refrigerator car for shipment. The questions to be considered are outlined in the tentative statement of the plan, in part, as follows:

> In many cases, as in the shipment of lettuce from California, ice is placed in the body of the car, not only to precool the product, but also to provide the necessary refrigeration to keep the product cold while in transit to the market. In other words, the refrigeration necessary to overcome the heat leakage through the walls of the car in transit is furnished by ice in the body of the car instead of in the bunkers, which are especially constructed for this purpose. The effect of the meltage of several thousand pounds of ice on the linings and floor of the car, the side and floor insulation, as well as the sills and other wooden parts of the car, is a question upon which we have very little definite data at the present time.

Effect on Refrigeration Equipment

It is, of course, recognized that refrigerator car floors as now designed are not absolutely waterproof. Specifications call for a layer of waterproofing cement beneath the wooden floor of the car next to the insulation. It is, however, doubtful that any method of waterproofing now practiced will withstand the continuous soaking combined with the weaving and racking of the car in transit and the freezing and thawing to which the soaked floors are frequently subjected. It therefore seems probable that there will be more or less damage to the insulation of the car used in wet shipments of produce, depending upon the condition of the equipment, the type of waterproofing, the type of insulation, and the number of times it is used for the shipment of produce under body icing. It seems probable that where ice is piled high on top of the load and up against the sides of the car that there is some damage to the insulation in the side walls of the car as well as to the lining and frame itself. Cars are usually insulated with hairfelt, flax linum, or some such materials on the sides and these materials in themselves offer very little resistance to the penetration of moisture. Car floors in which the insulation is of this type are even more liable to become soaked than are the side walls. In cars in which cork is used in the floor with a layer of water proofing compound next to the insulation, probably less damage will result than in the cars with hairfelt insulation. It does not seem probable, however, that in any of the types of construction now in use that damage to the insulation and wooden portions of the underframe of the car would be entirely obviated. In preliminary investigations, it has been shown that the rate of heat transmission through floors of cars which have been used in the shipment of lettuce under body icing was higher than in comparable cars which had never been used for this service.

The indications are then that in some cases at least vegetables can be delivered to market in a better condition under some kind of body icing than they can under standard refrigeration without ice in the body of the car. It is also evident that the continued soaking of the car floor is liable to injure the effectiveness of the insulation and result in a wetting of the insulation and deterioration of the wooden portions of the frame and floor. The refrigerator cars in service at the present time were not designed and constructed to withstand continued soaking of the floor.

Plan of Investigation

A general investigation should take into consideration three main points:

1. Can the produce be transported to market in good condition without body icing, or is some form of body icing necessary, and if it is necessary, how much ice should be used in the body of the car and where should it be placed?
2. What is the effect on the car of the water from the melting ice in the body of the car?
3. How can damage to the car be prevented economically and effectively, if damage occurs, and if it is found that the produce can not be delivered to market without body icing.

It will be possible to collect data on the points in question under all three headings and indeed some data on all three points have already been obtained in preliminary investigations. In a recent experiment with three cars of lettuce from the Imperial Valley, Calif. to eastern markets, it was found that lettuce shipped under body icing was in much better condition than that in a car shipped under standard refrigeration only. There was, however, very little difference in the condition of the lettuce in the car shipped with ice in the crates, without top icing, and under standard refrigeration and that in the car shipped under body icing only, that is, with ice in the crates and on top of the load and without ice in the bunkers. This, of course, is a single experiment and no general conclusions can be drawn therefrom. It is of value in indicating the methods to be followed in further investigation of this problem.

The portion of the problem under the first point will entail a series of transit tests with vegetables refrigerated in various ways similar to the preliminary test with lettuce from the Imperial Valley mentioned above. As a tentative plan such a test might include:

(a) Car with ice in the packages and on top of load;
(b) Car with ice in packages, no ice on top of the load, and under standard refrigeration;

(c) Car with ice in the packages, no ice on top of load, under initial icing—"do not reice"; and

(d) Car under standard refrigeration without body icing in any form.

It is, of course, obvious that this plan will be varied at different seasons of the year and from different localities; for example, the method of refrigeration employed from Imperial Valley in January and February will not necessarily be suitable from Puget Sound in July and August. Also, various commodities, such as broccoli, escarole, sweet corn, and spinach, will require somewhat different treatment than lettuce.

It is possible that in some cases at least precooling, and especially precooling by the ice water method, could be substituted either entirely or partially for body icing and transit tests with precooled vegetables are planned. The possibility of reviving the commodity at destination by means of an ice water bath or some other method is also planned.

Where practicable, the tests should consider also modification of the packages used for the shipment of these vegetables, including the manner of packing and loading, to determine which types are most easily cooled under standard refrigeration, with or without salt, and which types, by retaining the moisture, lessen to some extent the possibilities of injury to the equipment.

Inspections of the commodities will be made when they are loaded so as to see that the lading of all cars are comparable. Careful inspections will also be made at destination as to condition of the produce. The amount of ice used will be determined by weighing the ice in the body of the car, both in and on top of the packages, when the cars are loaded and when they are unloaded at destination. Determination of the ice meltage in the cars shipped under refrigeration will be made either by estimating the amount of ice or by weighing it. The temperatures of the lading and outside temperatures will be determined in the usual way by messengers traveling with the cars.

Records will be made of prices received for the produce at destination as a matter of information. Conclusions as to the carrying quality of the produce, however, will be based mainly on the condition on arrival as shown by careful inspection.

The cars used in these tests will be the usual type of equipment employed in the various sections for the shipment of this produce. Inspection of the equipment will be made, of course, to see that all the cars are in good condition and that all the cars in any one test trip are comparable. The length of haul or destination should be the markets to which the produce is usually shipped. The number of transportation tests, the localities from which they originate, and their destination will of necessity be dependent to some extent on the arrangement that can be made with shippers, carriers, and receivers. Inasmuch as this type of refrigeration is applied to a number of different vegetables grown in various vegetable producing regions, it is evident that rather extensive investigation will be required to determine the value of body icing as compared to standard refrigeration in marketing these perishables. It is planned to make as many tests with as many different commodities at various seasons of the year as is practicable.

Some preliminary work has been done in determining the effect of the water from the melting of the ice in the body of the car on the rate of heat transmission through the insulated floor. Evidence has been brought out in our experiments that this wetting of the floors is liable to decrease the insulating value of the floor. This tends to reduce the efficiency of the car in protecting the lading, either in refrigerator service or in heater service, and particularly the latter.

The investigation in regard to this point should take up a determination of the effect of one, two, three or several shipments of body iced produce on the various types of floors commonly in use, using both new cars and cars which have been in service for some time, testing the floors of the cars before and after they are used for this service by means of apparatus developed especially for this work which has been used in preliminary experiments. The amount of water in the insulation will be determined on pieces of the insulation removed for that purpose. The effect of the water on the side walls will, of course, also require consideration. The effect of the water on the wood portions of the car frame must be determined by careful inspection. It is, of course, well known that wood kept damp continually will rot and one good method would be to make inspections periodically for several years on cars which were used in this type of service. This, of course, would require a long time and would probably needlessly extend the investigation. Cars are to be given tests under extreme temperature conditions.

How can damage to the car be prevented economically and effectively, if damage occurs, and if it is found that the produce can not be delivered to market without body icing? This portion of the investigation is very closely related to the other two sections, and especially to the one just considered. Work on this portion of the problem will consist in testing out cars with different types of floors and side walls especially constructed to resist the penetration of water from melting ice. The conductivity of the floors to be tested before the cars are put in this service and then at intervals thereafter and tests of the actual water content of the insulation to be made when it seems desirable. Cars to be used in transportation of body iced perishables in regular service and subjected to extreme conditions, such as freezing and thawing, after they have had opportunity to become thoroughly water soaked. While the work will be confined mainly to the testing out of cars designed and built by the various refrigerator car companies, suggestions may be offered from time to time as the investigation progresses. A number of types of construction seems to offer possibilities in this connection among which are the four mentioned above.

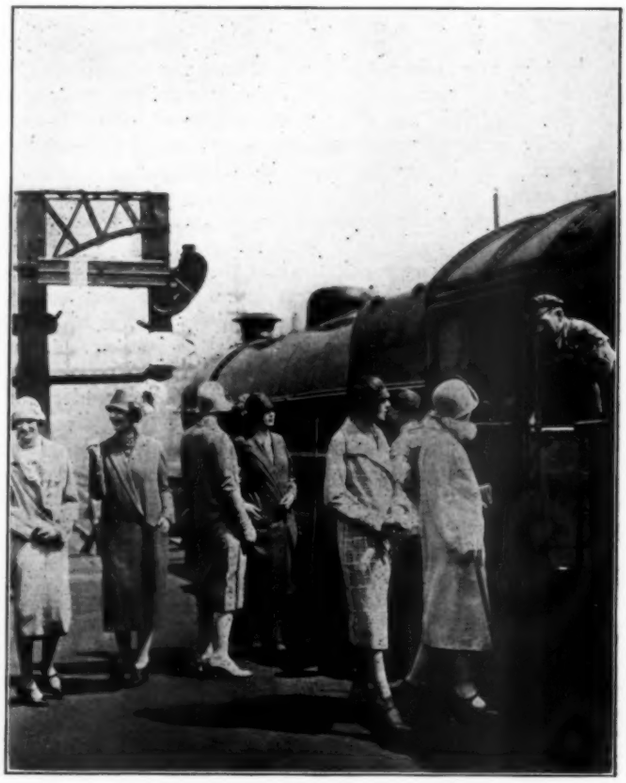
1. Cork floors extra heavily water proofed with usual 1¾ inch T and G wood wearing floor on top. Wooden floors to be painted with water proof paint which is odorless. Paint to be applied preferably with spray.

2. Calked wearing floor. Cork insulation, water proofed as in No. 1, the wooden floor to be beveled and calked as in ship construction with oakum and some bituminous compound which is odorless, soft, and not soluble in alkali.

3. Composition floors. Several types of such floors have been developed. They are usually to be applied to the insulation and are supposed to combine both water proofing and wearing floor.

4. Sheet metal over wood floor. Galvanized iron of suitable thickness with soldered joints over the wooden floor. The insulation and water proofiing to be the usual type.

The outline given above does not, of course, attempt to give details of all the experimental work to be carried on in connection with the proposed investigation on body icing. It has been our experience in this kind of work that methods and apparatus must in many cases be devised to meet conditions of the investigation which cannot be foreseen at the beginning. The above outline, however, should be regarded as a preliminary plan which may of necessity be modified because of some unforeseen contingency. It will be kept clearly in mind that the main object of the investigation is to determine the value of body icing in the shipment of certain types of perishables, the effect of this practice on the equipment, and means of obviating any deleterious effects on the equipment from this practice.



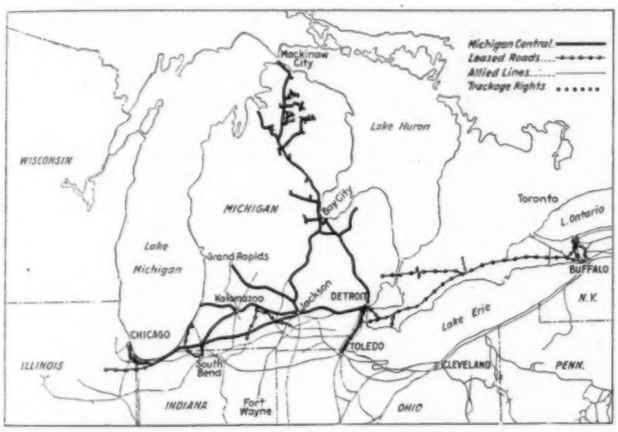
P. & A.

Manikins Show Latest Styles to Women Passengers on the London & North Eastern—Looking Over the Locomtive Prior to Departure of the Harrowgate Pullman Ltd.

Michigan Central Has Another Good Year

Net after charges in 1924 *equivalent to* $72.73 *a share on the capital stock*

THE Michigan Central annual report, made public on Monday last, showed net corporate income, after interest and other charges, of $13,627,534, equivalent to $72.73 per share on the company's $18,736,400 capital stock. This means that 1924 was the third of three successive extraordinarily good years of Michigan Central operations. In 1923, which was the best year in the company's history, the net after charges was $14,176,448, equivalent to $75.66 a share, and in 1922 the net was $12,818,271, equivalent to $68.41 a share. The best years prior to 1922 were 1916 in which net earnings approxi-



The Michigan Central

mated seven million dollars and 1921 in which they approximated seven and three-quarter million dollars. The increase in Michigan Central earning power has been so substantial in the last three years that the net in each of these years has been nearly double that of any of the best years preceding them.

The Michigan Central pays 20 per cent dividends, this rate having been established in the early part of 1923. These dividends total $3,747,208 and there was a surplus after their payment in 1924 of $9,880,254. Practically all the money which the Michigan Central pays out in dividends accrues to the New York Central, which now owns 94.8 per cent of Michigan Central capital stock.

The Michigan Central operates 1,862 miles of line and extends from the Niagara frontier to Detroit and thence across the southern part of Michigan to Chicago. Lines north from Detroit and Jackson via Bay City extend to the northern end of the Michigan peninsular, terminating at Mackinaw City. The mileage in Canada is leased from the Canada Southern.

Effect of Automobile Traffic

The southern part of Michigan is the home of the automobile industry. Much has been said in the past about the effect that the establishment there of that industry has had upon the Michigan Central or its neighbor, the Pere Marquette. The effect has been not only from the standpoint of the traffic which these roads carry in automobiles and auto trucks but also from the standpoint of the fuel and raw materials needed for the industry, and that developed, also, because of the needs of the rapidly growing population. The traffic in automotive vehicles while large is in itself not as great as one might possibly be led to believe. Thus, in 1924 the Michigan Central handled 163,262 carloads of automobiles and auto trucks, 14.7 per cent of the road's traffic in carloads. The tonnage of the same commodities was 1,200,829, or 4.1 per cent of the road's traffic in tons. Probably of special interest in this connection has been the manner in which the automotive industry has maintained its prosperity. The Michigan Central's tonnage of automotive vehicles in 1924 was approximately the same as in 1923, whereas fairly substantial decreases were shown in other commodities. In bituminous coal there was a decrease of 24.2 per cent.

Traffic in 1924

The Michigan Central in 1924 handled 9.4 per cent less revenue tons than in 1923. The revenue tons handled in 1923 were greater than in any other year. Those of 1924 were exceeded not only by those in 1923 but by those in 1918 and 1920. The revenue ton-miles in 1924 were 12.3 per cent less than in 1923 and less also than in each of the four years from 1917 to 1920, inclusive. They were, as a matter of fact, 18 per cent less than in 1918.

The same trend is evidenced in net railway operating income or net after equipment and joint facility rents as is evidenced in the comparison made above of the Michigan Central's net after charges in recent years. The Michigan Central had a standard return for operations during federal control (equivalent to the annual average net railway operating income for three years ended June 30, 1917, of $8,052,127). The net railway operating income in 1923 was $19,388,175 or 241 per cent of the standard return. The net railway operating income in

MICHIGAN CENTRAL OPERATING RESULTS, SELECTED ITEMS, 1914 TO 1924

Year ended Dec. 31	Mileage	Revenue tons	Revenue ton-miles	Average haul	Revenue per ton-mile, cents	Revenue train load	Revenue car load	Total operating revenues	Total operating expenses	Net operating revenue	Operating ratio	Net after charges
1914.....	1,800	19,196,012	3,066,954,000	160	0.675	462	16.67	$33,464,968	$25,181,484	$8,283,484	75.25	$414,419
1915.....	1,803	20,103,493	3,146,631,000	157	0.733	506	16.88	36,540,665	25,727,487	10,813,178	70.41	2,926,957
1916.....	1,862	24,947,892	4,172,557,000	167	0.714	580	18.27	46,418,790	30,646,261	15,772,529	66.02	6,837,436
1917.....	1,862	27,240,892	4,669,331,000	171	0.726	655	20.39	52,879,434	38,289,136	14,590,298	72.41	3,438,216
1918.....	1,862	29,653,126	5,203,158,000	175	0.883	698	22.39	68,520,087	51,070,072	17,450,015	74.53	547,858
1919.....	1,862	26,578,110	4,718,764,000	178	1.095	736	21.42	78,844,386	57,841,814	21,002,572	73.36	67,229
1920.....	1,866	30,203,776	4,824,740,000	160	1.144	761	24.20	87,790,799	77.140.559	10,650,240	87.87	3,805,785
1921.....	1,862	20,471,263	3,127,686,000	153	1.462	609	20.09	72,911,852	52,551,945	20,359,908	72.08	7,725,337
1922.....	1,862	25,261,826	3,852,216,000	152	1.446	604	18.86	83,426,407	59,576,357	23,850,050	71.41	12,818,271
1923.....	1,863	32,323,248	4,863,930,000	150	1.319	667	20.98	94,798,042	67,639,532	27,158,510	71.35	14,176,448
1924.....	1,862	29,273,172	4,265,934,000	146	1.370	616	19.45	87,614,662	62,139,524	25,455,138	70.95	13,627,534

1924 was $18,985,283, equivalent to 236 per cent of the standard return. This increase in net income was largely due to the increase in the efficiency of operation of the New York Central Lines which has been evidenced in many ways during the past few years. However, the Michigan Central has also been greatly favored by its increased level of rates. Thus, the revenue per ton per mile in 1924 was 1.37 cents as compared with 0.714 cents in 1916, which is an increase of about 92 per cent. In 1923, the revenue per ton per mile was 1.319 cents, an increase over 1916 of 85 per cent. The Michigan Central seems to be somewhat better favored than the eastern district as a whole; that district in 1924 showed an increase in earnings per ton per mile over 1916 of 74 per cent.

Revenues and Expenses

The Michigan Central's operating revenues in 1924 totaled $87,614,662 as compared with $94,798,042 in 1923, a decrease of $7,183,380 or 7.6 per cent. Railway operating expenses totaled $62,159,524 as compared with $67,639,532, a decrease of $5,480,008 or 8.1 per cent. The net revenue from operation—revenues less expenses—in 1924 was $25,455,138, a decrease of $1,703,372. The operating ratio was 70.95 as compared with 71.35 in 1923, the lowest operating ratio since 1916. It is interesting to observe that over half of the decrease in operating expenses was in a single primary account, namely, freight train car repairs. Expenses for maintenance of way decreased $239,296 or 2.1 per cent. Transportation expenses decreased $1,726,295 or 5.4 per cent. Maintenance of equipment decreased $3,662,185 or 18.2 per cent. The Michigan Central in 1924 spent $5,568,569 for freight train car repairs as compared with $8,750,785 in 1923 or $7,884,104 in 1922, the 1924 figure showing a decrease of 36.5 per cent from the figure for 1923 and the decrease of $3,182,216 was 55 per cent of the total decrease in operating expenses. There was a decrease of $791,130 or 15.4 per cent in the amount spent for steam locomotive repairs but, inasmuch as this decrease was about the same as the increase in 1923 over 1922, the amount spent for this purpose in 1924 was about the same as in 1922. This situation with reference to the marked decrease in maintenance of equipment expenses in 1924 is one that has been typical of many railroads. It parallels almost exactly, for example, the situation described with reference to the Baltimore & Ohio in an article appearing in last week's issue of the *Railway Age*.

The Michigan Central's equipment condition is brought out by the following comparisons of the unserviceable freight locomotives and bad order freight cars as of selected months of the past three years:

MICHIGAN CENTRAL

	Freight locomotives unserviceable	Bad order cars
January, 1922	22.4	16.6
January, 1923	24.3	7.3
January, 1924	13.3	6.2
January, 1925	18.2	5.7
April, 1925	18.4	5.2

In April, 1925, the Michigan Central had an average of 99 locomotives stored in serviceable condition, approximately one-third of all the locomotives on line. At the same time it had 2,263 freight cars stored.

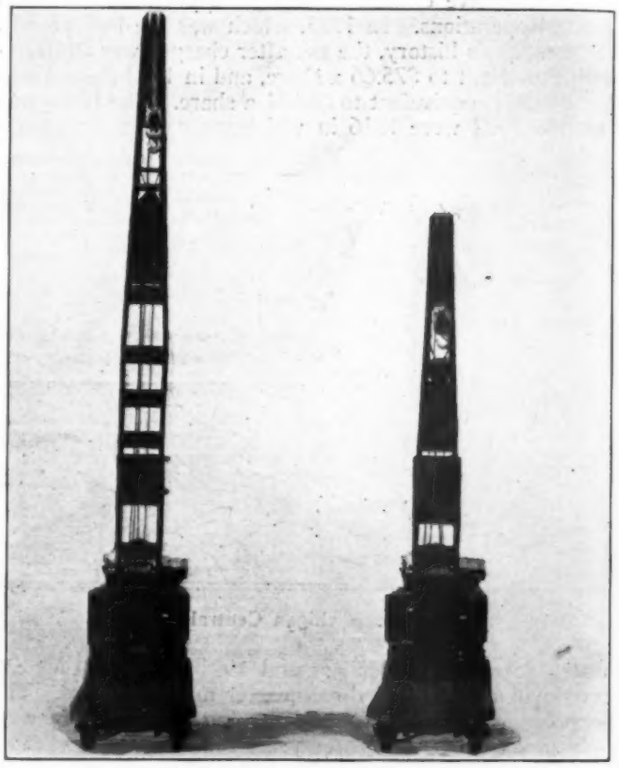
Additions and Betterments

Additions and betterments in 1924 totaled $12,610,269, which is not as large an amount as in 1923 but considerably larger than in most previous years. Of the net increase, $2,895,327 was in road and $9,565,470 in equipment. One of the most important projects in 1925 was the completion of the new double track steel arch bridge spanning the Niagara Gorge and replacing the old cantilever bridge constructed in 1883. The new bridge was completed and turned over for operation early in 1925, the total cost being estimated to be $2,438,000.

The Michigan Central has an interesting innovation in its annual report in the form of two pages of illustrations of the bridge, one showing it in process of construction and the other showing the first train crossing the new arch on February 16, 1925.

Crane with Telescoping Boom

THE Elwell-Parker Electric Company, Cleveland, has added a telescoping boom to its Type CK portable electric crane. An especially long boom is at times a hindrance rather than a help, while with a short one there are frequent calls for a lift beyond the



The Crane with Boom Elevated and Lowered

boom range. To meet this situation a telescoping boom with four settings between 12 and 17 ft. is now offered. The boom is all steel and is raised or lowered by a special set of cables operated from an electric motor-driven hoist unit with two grooved drums. The second drum carries a separate ⅜-in. plow steel non-twist cable to a two-part line hook block sheave on the boom tip.

The heavy boom side channels are latticed and gusseted with a continuous ¼ in. steel plate extending above from the hoist cable sheave to the boom elevating sheave, i.e., throughout the length of the curved head of the boom. The lower box or enveloping section of the boom is of formed plate steel, providing a stout support for the telescoping portion. A feature of this boom is that the distance from the top of the boom to the hook is but 23 in.

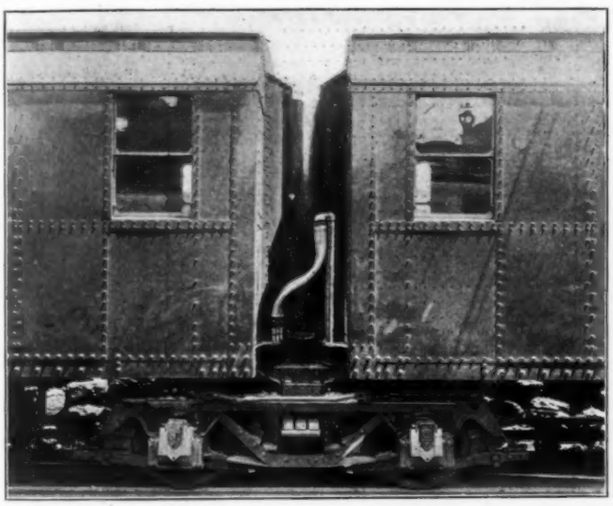
The battery compartment carrying the hoist unit counterbalances the boom with a load on a steel crane column supported on ball and roller bearings. This column is set in a heavy pedestal firmly anchored in the main frame. The boom may be furnished with either a hand or motor slew as required.

Rapid Transit Train Consisting of Four Articulated Cars*

Reduction in weight, maintenance, operating and first costs —Total length 548 *ft. with a capacity of* 2,000 *passengers*

By W. G. Gove
Superintendent of Equipment, Brooklyn-Manhattan Transit Corporation, New York

TO meet the demands of the constantly increasing density of traffic in the subway of the Brooklyn-Manhattan Transit lines, a test train consisting of four articulated units, each 137 ft. long, has been constructed. The articulated car consists in its simplest form, of two car bodies permanently coupled together, each with its outer end supported on a truck in the usual manner, but having the two body ends adjacent each other, supported on one truck common to both bodies. Thus a two-body articulated car is supported on three trucks, a three-body car on four trucks and so on. Up to the present time no car composed of more than five bodies on six trucks has been assembled.



The Ends of Two Cars Supported on One Truck—Note the Vestibule Drum Between the Cars

The system of articulating cars was originated in England some 18 years ago and numerous trains of steam operated articulated cars are in successful service abroad. In this country, articulation has thus far been restricted to electric street railway cars. The test train of articulated subway cars of the Brooklyn-Manhattan Transit lines is the first of its kind for subway operation.

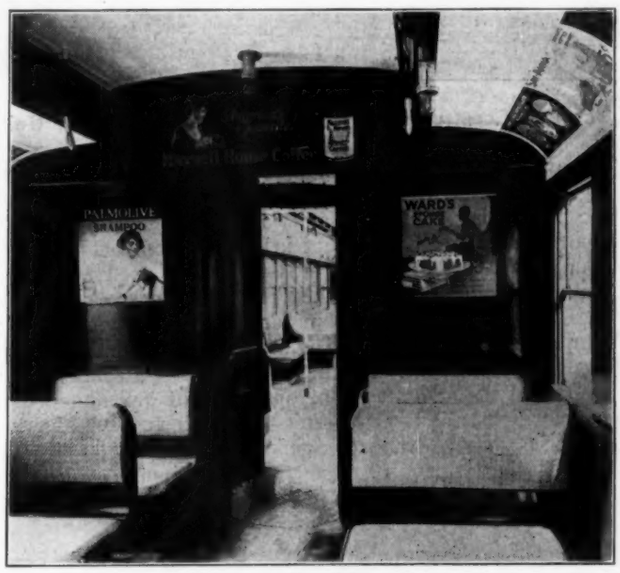
In the test train consisting of four articulated subway cars, each car consists of three bodies supported on four trucks. The trucks at the outer ends of the car are fitted with two motors each, while the trucks at the point of articulation are idlers. Each articulated car has seats for 160 passengers and a total capacity of 550. The train is 548 feet long and will accommodate over 2,000 passengers.

There are six sliding doors on each side of each car. Each door opening is four feet in the clear. These doors are controlled from the trainman's position on the end platform of the car. A substantial railing protects this platform and allows the trainman a clear view of the entire length of the outside of the car when at the station platform. The doors are controlled through a substantial hand operated switch which simultaneously opens or closes all six doors on one side of each car. Thus, from the trainman's position between the ends of two cars, he can, by operating two switches, control the movements of twelve doors.

Communication between the bodies of each articulated car by the way of a cylindrical, weathertight passageway at the point of articulation. This passageway is known as the drum.

Passing between adjacent articulated cars is made convenient by the wide end platforms.

One of the special conditions to be met in subway service is encountered at junction points where at times an abrupt change of elevation is made in combination with reverse curves, occasionally complicated by superelevation of the outer rail. This condition requires that the pivot truck, which supports the adjacent ends of two bodies, shall be fitted with a center plate and side bearings capable of maintaining the proper relation between adjacent ends of the bodies at all times. To meet this condition, the pivot trucks of the B. M. T. articulated car



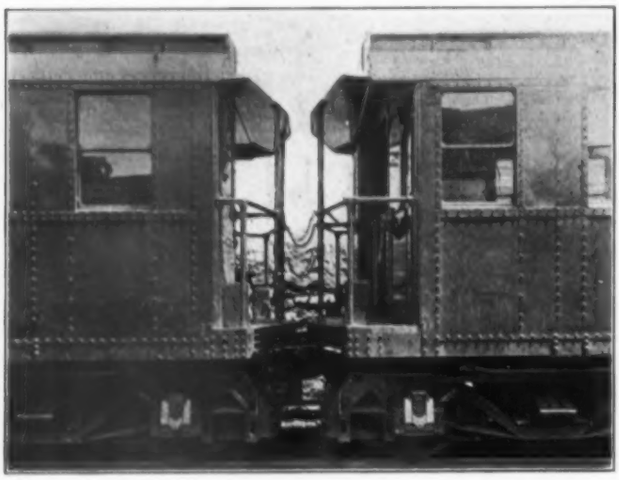
Cylindrical Drum Connection Between the Bodies Provides a Continuous Aisle Through Each Articulated Car

* Abstract of paper presented at the American Electrical Railway Association at Bluff Point, N. Y., June 26.

are fitted with hemispherical center plates and with flexible side bearings capable of tilting at various angles.

At the point of articulation of the B. M. T. car, the functions of body end sill and body bolster are combined in one member. The semi-circular center plate is cast integral with the end sill and bolster filler. This casting also acts as a buffer block, the design being such that in buffing the impact occurs on the center line of the longitudinal sills of the body underframe. The bottom face of the center plate is formed to fit the hemispherical bowl-shaped surface of the truck center plate. These surfaces of the center plate act to keep the buffing faces of the bodies in constant contact.

The drum is supported on a ball and socket attached to a bracket directly above the center plate of the pivot truck. A weathertight connection between the drum and the end posts of the cars is maintained by four soft rubber rollers of large diameter. The rubber rollers are enclosed on three sides by a light steel housing which is fitted at



The End Construction of the Articulated Subway Car Units

top and bottom with bearings in which the shaft supporting the rubber roller turns. This housing together with the protruding rubber roller is actuated by springs which insure that the roller is kept in constant contact with the drum. The top of the drum is formed to shed water and makes a weathertight connection with the hoods of the adjacent bodies. The drum is lined with Agasote as a temperature insulation and white enameled hand rails are applied to furnish a convenient guide for passengers.

One of the advantages of operation of articulated cars from which satisfactory results are expected is reduction in noise. The method of joining the bodies at the point of articulation is such that there is practically no lost motion between them. This should eliminate the usual sounds caused by the old form of connections.

Favorable comment is always made on the riding qualities of articulated cars. The system of support and absence of overhang act to check the tendency to side sway and results in a very steady riding vehicle. This will contribute to the comfort of passengers and promote freedom of movement throughout the car and train.

THE THREE NEW YORK CENTRAL girl employees who were candidates to make the Independence Pilgrimage to France in the Centennial Election of the Thomas Jefferson Memorial Foundation, were declared elected and they sailed with the party of 60 American young women on the S. S. Leviathan, July 4, for a five weeks' trip.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading for the week ended June 27 amounted to 991,341 cars, an increase of 8,741 cars over the total for the preceding week and of 83,090 cars as compared with the corresponding week of last year. As compared with 1923 there was a decrease of 30,130 cars but the cumulative total for the year to date is still above that for any previous year. For the 26 weeks ended June 27 the loading this year amounted to 24,297,628 cars, as compared with 23,185,152 cars last year and 24,005,502 cars in 1923. Increases as compared with the corresponding week of last year were shown in all districts and in all classes of commodities except grain and grain products and livestock. Miscellaneous loading showed an increase of 45,858 cars. Only merchandise and miscellaneous freight, however, showed increases as compared with 1923. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

REVENUE FREIGHT CAR LOADING

Week Ended Saturday, June 27, 1925.

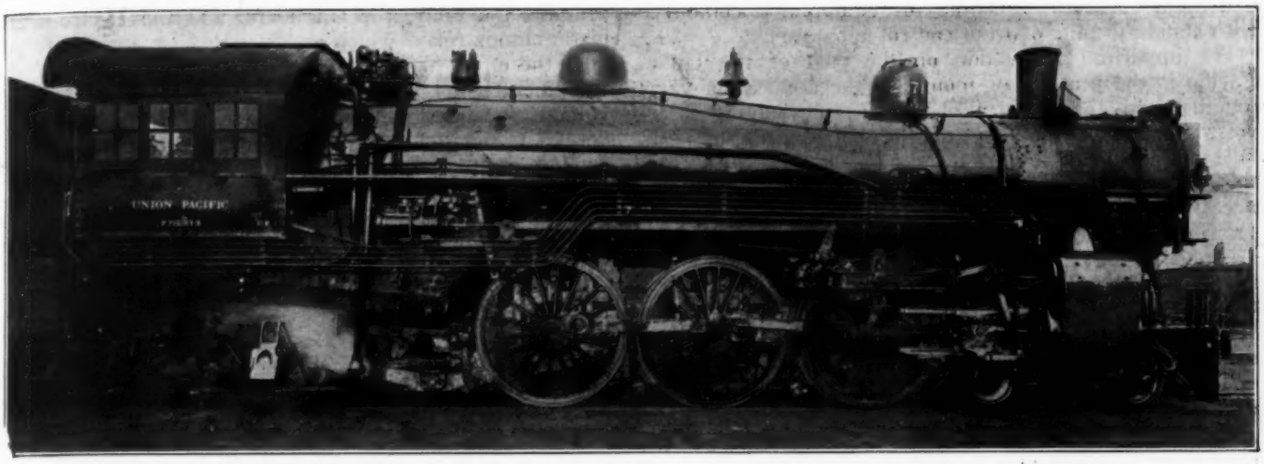
Districts	1925	1924	1923
Eastern	236,146	216,677	249,829
Allegheny	204,961	187,985	225,474
Pocahontas	51,206	41,676	40,549
Southern	142,151	123,630	132,033
Northwestern	149,660	140,934	171,536
Central western	141,421	137,598	142,715
Southwestern	65,796	59,751	59,335
Total western districts	356,877	338,283	373,586
Commodities			
Grain and grain products	36,414	38,321	37,117
Livestock	27,150	27,851	30,198
Coal	159,473	144,753	185,324
Coke	9,147	6,986	14,745
Forest products	71,267	67,851	79,297
Ore	63,026	59,198	80,791
Mdse., l.c.l.	255,807	240,092	245,108
Miscellaneous	369,057	323,199	348,891
Total	991,341	908,251	1,021,471
June 20	982,600	903,546	1,004,982
June 13	987,196	902,592	1,008,838
June 6	994,874	910,793	1,012,312
May 30	920,514	820,551	932,684
Cumulative total, 26 weeks	24,297,628	23,185,152	24,005,502

The freight car surplus continues to decrease gradually and for the period June 15 to 22 averaged 308,824 cars, or 4,670 less than the average for the preceding week. This included 111,820 coal cars and 148,869 box cars. The Canadian roads for the same week had a surplus of 37,305 cars, including 33,700 box cars.

Car Loading in Canada

Revenue car loading at stations in Canada during the week ended June 27 totalled 52,458, an increase over the previous week of 971 cars, grain loading being heavier by 1,204 cars, live stock by 223 cars and miscellaneous freight by 203 cars. Merchandise loading fell off 357 cars and lumber 168 cars. The decrease from the same week last year was 5,001 cars, of which 3,014 cars were in grain, 3,245 in coal and 328 cars in merchandise, gains being recorded in pulp and paper, 358 cars, in other forest products, 285 cars, in ore, 252 cars, and in miscellaneous freight, 895 cars.

	Totals for Canada			Cumulative totals to date	
Commodities	June 27, 1925	June 20, 1925	June 28, 1924	1925	1924
Grain and grain products	6,602	5,398	9,616	153,550	216,581
Livestock	2,197	1,974	2,069	56,704	56,359
Coal	1,743	1,586	4,988	93,165	125,506
Coke	132	201	203	7,151	6,197
Lumber	4,024	4,192	4,108	87,712	93,311
Pulpwood	2,134	2,221	2,312	79,851	83,001
Pulp and paper	1,877	1,992	1,519	53,877	53,219
Other forest products	2,835	2,710	2,550	76,790	72,910
Ore	1,679	1,805	1,427	33,385	29,848
Merchandise, l.c.l.	15,505	15,882	15,833	386,104	364,617
Miscellaneous	13,729	13,526	12,834	291,972	294,265
Total cars loaded	52,458	51,487	57,459	1,320,261	1,395,814
T'l. cars rec'd from connections	32,829	31,644	29,995	855,647	858,387

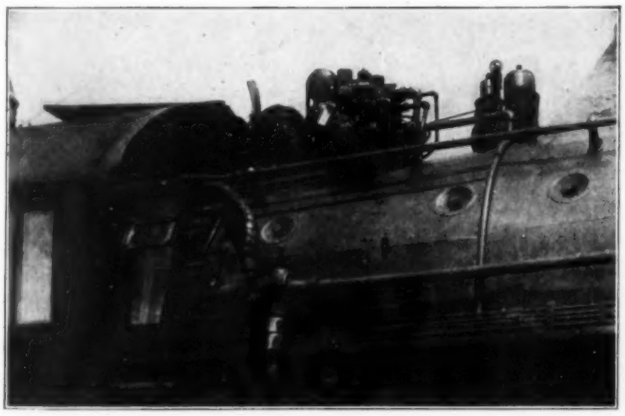


Typical Passenger Locomotive Equipped With Train Control

Union Pacific Installs Train Control

Union two-speed continuous system placed on 102 *miles of double track,* 100 *engines equipped*

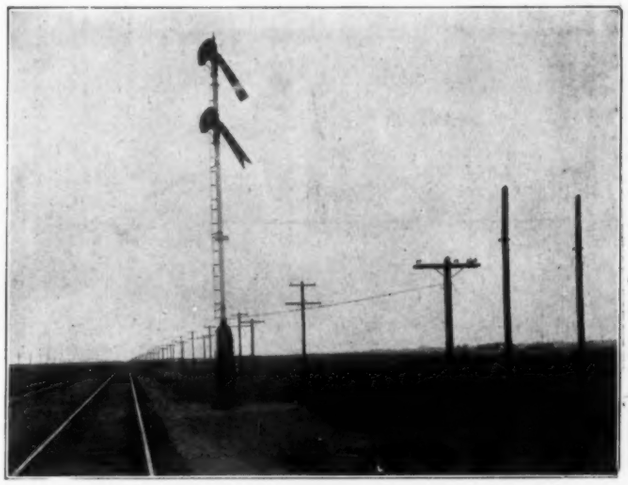
THE Union Pacific placed in service on June 1, its first complete division of train control on 102 miles of double track from Sidney, Neb., to Cheyenne, Wyo. This installation is of the two-speed type of the Union Switch & Signal Company's continuous inductive system, 100 locomotives being equipped,



Application Valve Assembly Is Mounted on the Boiler Ahead of the Turbo-Generator

which includes the full assignment of power to this division. As this division was previously equipped with direct current semaphore automatic block signals the wayside construction in connection with the installation of train control included two major items, first the rebuilding of the signal pole line and the addition thereon of a 2,300-volt alternating current line for feeding the train control circuits and second, the relocating of certain signals and track circuit feeds to secure the proper braking distances for the new train control system. Field work is now in progress on the wayside changes in the second division from North Platte, Neb., to Sidney, and orders have been placed for 31 additional locomotive equipments which will complete the equipment of all engines operating over these two engine districts since many of the locomotives run over two or more divisions and the passenger engines run from Omaha to Cheyenne, 507 miles, without change.

The Oregon-Washington Railroad & Navigation Co., a unit of the Union Pacific System, has installed a similar system of train control between Portland, Ore., and The Dalles, which includes 83 miles of single track and 2.5 miles of double track. Thirty-three locomotives



Typical Signal Location Showing Old Pole Line in Service and New Line Under Construction

are equipped for operation on this district and the complete installation was placed in service on April 1, 1925.

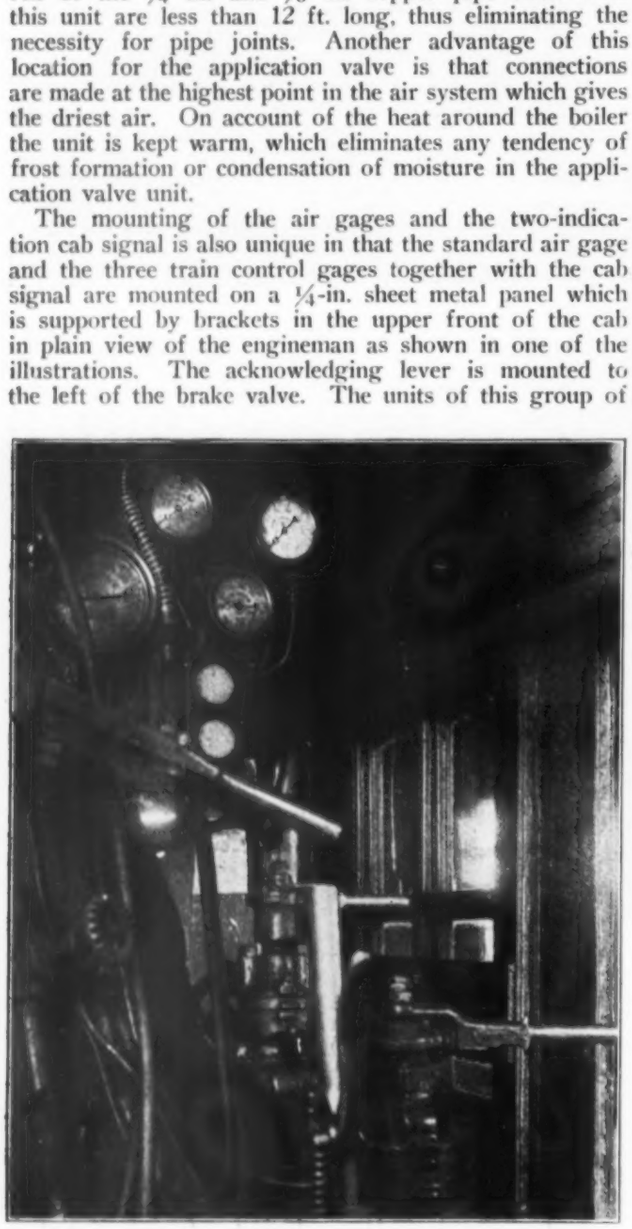
Installation of Locomotive Equipment Simplified

With the experience gained while equipping the first ten locomotives the Union Pacific devised a system of grouping the train control apparatus so as to result in a minimum of piping and wiring runs and also laid out

a definite man-hour schedule for equipping locomotives with standard units of train control apparatus.

An important innovation on the part of the Union Pacific is the practice of mounting the application valve together with the quick release and acknowledging reservoirs in a group on top of the boiler near the cab. All of the ¼ in. and ⅜ in. copper pipe runs from this unit are less than 12 ft. long, thus eliminating the necessity for pipe joints. Another advantage of this location for the application valve is that connections are made at the highest point in the air system which gives the driest air. On account of the heat around the boiler the unit is kept warm, which eliminates any tendency of frost formation or condensation of moisture in the application valve unit.

The mounting of the air gages and the two-indication cab signal is also unique in that the standard air gage and the three train control gages together with the cab signal are mounted on a ¼-in. sheet metal panel which is supported by brackets in the upper front of the cab in plain view of the engineman as shown in one of the illustrations. The acknowledging lever is mounted to the left of the brake valve. The units of this group of

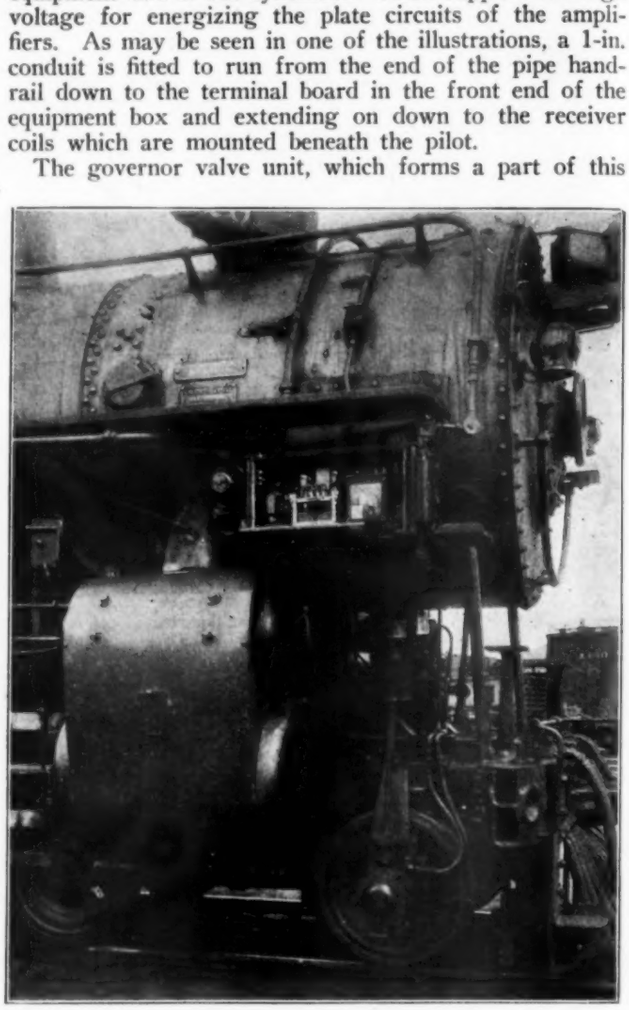


The Train Control Air Gages and the Cab Signal Are Mounted in a Group. Note Small Acknowledging Lever to Left of Reverse Lever

apparatus have been so located as to allow a minimum length of pipe runs and yet give efficient service in train operation.

A third group of train control equipment, including the governor, the application reservoir, the receiver coils and the equipment box, are mounted at the front of the locomotive. This grouping permits the use of one four-wire cable between the cab and the relay case, this cable being carried through the pipe hand rail. The sheet metal equipment box, mounted beneath the running board, contains the relay, the amplifiers, and the electro-pneumatic cutout relay, which are mounted on springs to reduce the effect of vibration. Attached to the rear of the equipment box is the dynamotor which supplies the high voltage for energizing the plate circuits of the amplifiers. As may be seen in one of the illustrations, a 1-in. conduit is fitted to run from the end of the pipe hand-rail down to the terminal board in the front end of the equipment box and extending on down to the receiver coils which are mounted beneath the pilot.

The governor valve unit, which forms a part of this



Side View with Equipment Box Open

front end group, is mounted on heavy brackets attached to the engine frame in a position such that the connecting shaft to the driving gear on the end of the pony axle is vertical. The bracket supporting the outer end of the governor valve unit is forged from a 1 in. by 4 in. steel plate as shown in the front end view. The other bracket is forged from a steel bar, 1 in. by 2¼ in. These brackets are bolted to the front frame section by 1 in. steel bolts. It should be noted that the form of these brackets is such as to prevent side motion in any direction and therefore hold the governor valve unit in place properly. A special feature of the Union Pacific installation is the use of a sheet iron guard attached to the end of the governor and extending down so as to cover the thermoid coupling of the upper portion of the driving shaft, thus eliminating any chance for a man's clothes or feet to be caught. The four ¼ in. and the one ½ in. pipes, running from the cab to the front end are supported by clamp brackets made of ½ in. by 1½ in. strap-iron bolted to the inner edge of the running board at intervals of about 6 ft.

In order to establish a working schedule for the installation of train control equipment on locomotives a man-hour basis was worked out. The establishment of

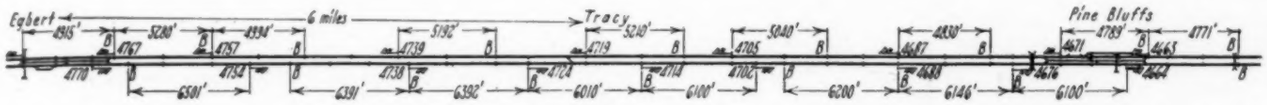
this man-hour schedule has been of great assistance in estimating the time required to complete the work on engines, also for cost accounting and in planning for any changes of equipment on locomotives in service.

Pole Line Rebuilt and Signals Relocated

Automatic block signals were installed on the division from Cheyenne, Wyo., to Sidney, Neb., in 1906, using lower quadrant two-position semaphore signals with a home and distant arm mounted on the same mast, the signals being located for approximately one mile blocking. These signals are operated by energy from a 10-volt Edison storage battery located in the lower signal case. These batteries are replaced at intervals of 30 days, being charged at a central battery station. Three cells of primary battery are used in multiple on each track circuit. A pole line using 25 feet cedar poles was constructed, when the signals were installed, to carry the three signal control wires.

In making the train control installation the old pole line was replaced by a new line using 30 ft. full creosoted Southern pine poles, 40 to the mile. This line now carries two No. 6 solid copper wires on the upper 4 ft. arm for the 2,300-volt feed for the train control. The 10-volt signal control wires and the 110-volt train control wires are carried on the lower arm which has from 6 to 8 pins. The pole line construction was handled by two crews, one crew distributing the poles and crossarms, digging the holes and setting the poles with the arms in place. The second crew strung the wire and guyed the poles where necessary.

The automatic signals were originally spaced from 5,000 ft. to 7,000 ft. apart, depending on the distance between sidings. Under some circumstances, especially at distant signals approaching stations, it was necessary to move some of the signals to secure proper braking distance as established under the train control system. A minimum braking distance for full speed to stop, or 5,000 ft. compensated for grades was taken as standard. On ascending grades of 0.6 per cent this distance is reduced to about 4,900 ft. and on descending grades of 0.6 per cent approximately 6,000 ft. is used. With the old arrangement of track circuits there were two or more track circuits in each block. In the majority of cases it was necessary to move one of the cut sections or establish a new track feed for the train control circuits at the *B* point, a proper braking distance from the signal involved.



Track and Signal Plan from Pine Bluff to Egbert, Showing Braking Point Location on a Rising Grade of Approximately 0.6 Per Cent Westbound Throughout

Operating Features of A. C. Supply

Power for the 2,300-volt line is purchased from the Wyoming Light & Power Company delivered to the right-of-way at Cheyenne, Sidney, Pine Bluffs, and Kimball. Automatic switchboards are installed at each of these points so arranged that if one supply is cut off, the next feed will cut over on the dead section automatically. If there is a sustained short circuit on one section of the line the inverse time element relay will disconnect the shorted section from the source of power. Sectionalizing switches are located in the line at intervals of about five miles so that a minimum section will be out of service in case of the destruction of any portion of the line. The feed transformer at each of these locations has a capacity of 10 kva.

Where any two signals or a.c. track feeds are less than 1,000 ft. apart a single line transformer 2,300-110 volts of .75 kva. capacity handles the load. At a single location a .75 kva. transformer is used. A unique feature

UNION PACIFIC RAILROAD

RECORD OF ELECTRICAL INSPECTION AND REPAIRS

Engine No._____ **Month**_____ **19**____

Date and Place Last Monthly Inspection_____

Date	Train No.	Terminal	Megohm Reading	HEAD LIGHT VOLTAGE		Dyna. Voltage	RELAY PICK UP		Steam Pres.	GRID LEAKS VALUES			Condenser Value	Output Data	Incoming Inspector	Outgoing Inspector
				Found	Left		Found	Left		Ta.	Tb.	L.				
1																
2																
3																
28																
29																
30																
31																

Megohm Reading: Megger Readings should be as high as possible and in no case less than one Megohm. Inspector must see that this condition exists before placing his "OK" in this column.

Output Data: If Output Data is taken mark "yes" in this column and attach tag showing values.

General: This card to be filled out and signed by Inspector upon arrival of engine at terminal. It must also be checked and signed by Inspector on duty when leaving terminal. Any changes made by outgoing Inspector must be noted in proper space on back of this card.

Form for Monthly Report of Daily Inspection of Locomotive Train Control Apparatus

of the Union Pacific installation is that the automatic signal system is entirely separate and distinct from the train control, continuing in operation on its own d.c. power regardless of the train control. The train control is dependent on the supply of the 2,300-volt a.c. line, which is fed from duplicate sources controlled by automatic cutover switchboards thus rendering reliable service.

The Principle of Train Control Operation

The secondary of a small 10-watt transformer is connected through a reactance to the exit end of each track circuit in series with the primary battery which forms a part of the d.c. signal system. When a train occupies the track circuit a current from the secondary of this transformer at approximately 1.2 volts goes down one rail across the axles of the locomotive and back on the other rail. This current flowing in the circuit thus formed induces a current in the receiving coils mounted beneath the pilot of the locomotive, which energy is amplified and used to pick up the train control relay on the locomotive. If a signal is indicating "stop" the a.c. train control energy is cut off the track in the track circuit between the *B* point and the signal involved and the a.c. train control energy is also cut off of all track circuits in the entire block governed by the signal. When a locomotive enters a track circuit not energized by a.c. current the train control relay is de-energized which releases the high speed magnet, the controlling medium between the electric and pneumatic portions, and unless the engineman acknowledges, a full service application of the air brakes will result automatically.

UNION PACIFIC RAILROAD COMPANY

Telegraphic

Engineman's Automatic Train Control Report

INSTRUCTIONS TO OPERATORS:—Sending operator use signal "A T C" to indicate title of report. In transmitting send symbol LETTERS and ANSWERS only.

..... 19..

TO Chief Dispatcher, North Platte,
Signal Supervisor, Cheyenne,
Roundhouse Foreman, ...

A. Train..... Engine.....
B. Delayed..... M. to..... M
C. At Signal No.....
D. Elsewhere .....
(Give Approximate Location)
F. Cause of Delay .....
(Give Key Number)

KEY TO SYMBOL NUMBERS

1. Broken Rail
2. Switch Open
3. Track Being Repaired
4. Car or Engine Fouling Main Track
5. Train in Block
6. Failure of A. T. C. Pneumatic Equipment
7. Failure of A. T. C. Electrical Equipment
8. Failure of A. T. C.—Cause Unknown
9. Normal Operation

G. Remarks.....

.....
Engineer

INSTRUCTIONS TO ENGINEMEN:—Whenever delayed by A. T. C. apparatus or signals, Engineman will make this report and send by wire from first open telegraph office.

In case no delay from this source, make report at end of trip showing Key No. "9" Normal Operation, and place in receptacle provided in engine cab, in which case will not be sent by telegraph.

Form on Which Enginemen Report Train Control Operation

UNION PACIFIC RAILROAD COMPANY

REPORT OF AUTOMATIC TRAIN CONTROL PERFORMANCE

DISTRICT..... TO..... MONTH..... 192..

ENGINE	NO. OF TRIPS	FAILURES				
		ENGINE		ROADWAY	UNDETERMINED	TOTAL
		ELECTRIC	PNEUMATIC			
TOTAL						

Signature.....

Title.....

Form for Monthly Performance Report on All Engines

The Operation of Trains with Two-Speed Automatic Train Control

On the 102-mile double track division between Sidney and Cheyenne, the Union Pacific operates six westbound and seven eastbound regular passenger trains, two westbound and one eastbound express and mail trains and about 12 freight trains each way per day. All of these trains are handled by locomotives equipped with automatic train control. In ordinary train operation there is sufficient spacing between trains so that a high speed indication is given normally; however, under certain conditions approaching stations or passing tracks it is necessary that trains approach or enter occupied blocks.

In approaching a signal indicating "Stop" an automatic brake application is made at braking distance from the signal unless the engineman acknowledges and reduces speed to less than 20 miles an hour. This speed limit is imposed not only in approaching the signal but also throughout the block governed by the signal. If the engineman should exceed this speed limit the brakes are applied automatically.

The cab indicator has two lights, one or the other of which is burning at all times when operating in train control territory. The upper light is green, indicating "Proceed," and is lighted normally. The lower lamp is red, indicating "Stop," or reduce speed to less than 20 miles an hour. The automatic train control cab signals supplement the automatic block signals in governing the use of blocks, and do not supersede the superiority of trains, or dispense with the use or the observance of automatic block or interlocking signals or other signals.

When the cab indicator changes from green to red the engineman acknowledges with the acknowledging valve, and if the speed is in excess of 20 miles an hour, must immediafely reduce speed to less than 20 miles an hour, and be prepared to stop. When a train is proceeding after having been stopped by an automatic home block signal or by automatic train control, if the cab indicator changes from red to green, the train may resume normal speed after it has moved one train length beyond the point where the cab indicator changed from red to green. This latter provision is made to take care of interruptions caused by broken rails.

Within automatic train control territory, when moving

over a track which is not equipped with automatic train control circuits, the train or engine must be kept below a speed of 20 miles an hour. When an engine is running backward, or is pushing cars, it must proceed at a speed less than 20 miles an hour, to avoid an automatic brake application. An engineman of a train entering a block is held responsible in case of an accident caused by overtaking a preceding train. This does not relieve enginemen and trainmen from protecting their train as required by the rules. The enginemen have all been instructed personally as to the functions and operation of the train control and an explicit set of instructions issued.

Watchfulness an Aid in Reducing Claims on Sewer Pipe*

By E. F. Ford
Freight Service Inspector, C. B. & Q., Kansas City, Mo.

THE bill that is paid by the carriers for damaged sewer pipe runs into a huge fortune yearly. Charged as it is to rough handling, it remains a thorn in the side of every man concerned in its handling. Let us see if all of this loss is due to rough handling, and thereby chargeable to the carrier, by comparing the results attained when large sewer systems were built in two different towns, on a distant section of the Burlington, which will be referred to as cases No. 1 and No. 2.

The agent at destination in case No. 1 notified me when the movement of the 31 cars in the job would start, and thus enabled me to visit the sewer pipe plant which filled the contract, to check up the loading, stowing, bracing, etc. Arrangements were then made with division headquarters to spot this sewer pipe as it arrived on a particular track at destination which was seldom disturbed by switching, and an order was put out cautioning all crews that sewer pipe in the course of unloading would be on this track for some time and to handle it accordingly.

As the contractor's teamsters unloaded this pipe each piece as it came from the car to the dray was given a tap with a light hammer. Every piece that rang true under this test was accepted, and those that did not ring clear and true, but which gave off a flat ring, were set aside as bad order pipe and rejected. Out of the first car unloaded eleven pipe were rejected by the teamster as bad order for which he requested freight bill notation to cover. A review of the rejected pipe by the agent and myself convinced us that some of them at least bore no sign of railroad damage, even though they did not pass the teamster's hammer test, but we could not convince the teamster.

We then got in touch with the contractor and had him come down and go over the rejects with us when seven out of the eleven pieces were found and agreed to have heat checks accounting for the flat ring—factory defects, for which the carrier was clearly in no way responsible and to which the contractor agreed, instructing the teamster to accept them. The other four pieces were unquestionably broken and he was given freight bill notation. All subsequent rejects were similarly inspected and classified. This sewer pipe was delivered some 70 miles from point of shipment, and while the 31 carloads were hauled through a very hilly country, the total breakage out of the 31 cars was only 65 pieces, or less than the one per cent recognized as nominal and unavoidable by the Western Weighing & Inspection Bureau. This shows the result of teamwork between carrier and shipper and the value of an understanding between the delivering agent and the consignee, all due to advance notice having been given which enabled us to line up for it.

In case No. 2 we did not do so well. This particular sewer was built at a station on the same division of the railroad, but only 40 miles from point of shipment, the contract being filled by the same shipper as in case No. 1 and involving a movement of 28 carloads of pipe. It developed that the contractor, finding the weather forecast in his favor, ordered quick shipment and the first 17 cars were forwarded in short order. The first we heard of the movement was by letter from the agent at destination complaining of abnormal breakage, stating that the bracing seemed alright and inquiring if something could not be done to stop the "rough handling" at the shipping point which to him was so clearly evident. It struck me as singular that his pipe was being roughly handled, when it was switched by the same crews, that switched in case No. 1 just a few weeks before.

Arriving at this station I found the bracing faultless as reported by the agent—that is the center doorway bracing put in to fill the vacant space where the lading meets. This is largely braced with 2-in. by 4-in. lumber on 12-in. pipe or smaller and will withstand almost any shock in handling. A couple of hundred pieces of broken pipe found on hand from these 17 cars, however, showed conclusively that something was wrong somewhere; the station record showed as many as 64 pieces broken in a single car or as many in the one car as were checked up against the entire 31 cars in case No. 1.

As this pipe was eight and ten inches in diameter it should, according to the classification, be protected by a gate in front of each tier, each gate to be made of hardwood or yellow pine lumber ⅜-in. thick or when soft lumber is used to be ½-in. thick, with 22 pieces in each gate. Examination of the gates which came out of these 17 cars and measurements of the lumber developed that it was about one-half as thick as called for and instead of being hardwood or yellow pine was a very inferior grade of cottonwood. The cause of the trouble was thus located as directly chargeable to the gates while the center bracing was alright as had been reported.

We took an armload of these gates neatly wrapped up to the factory and showed the superintendent pieces where the pipe had cut clear through; by pipe thus getting against pipe abnormal breakage was inevitable. The superintendent understood and explained they had gotten hold of some cull material from the lumber mill and this was some of it. Prompt instructions were issued by the superintendent to use no more of it in the remaining 11 cars to be shipped. The movement of these cars was duly checked, was found to have proper gates, and the total breakage of the eleven cars was within the one per cent regarded as nominal or just about the percentage of breakage with the 31 cars contained in case No. 1. Still examination of the station bad order reports showed them lined up to charge the breakage in these 17 cars to "rough handling."

"Rough handling" has many ramifications. I will relate one other case. A shipper of drain tile became alarmed at reports of abnormal breakage on tile going onto a section of the railroad on which he was a regular shipper and without complaint. He sent a man to investigate and found that the tile arrived in good shape, but was being broken by the unloading teamsters, and the broken tile were being placed back in the car to be tabbed up when each car was made empty as breakage due to "rough handling," as it unquestionably was, but through no fault of the carrier.

*Abstracted and rewritten from remarks made before a recent meeting of the St. Louis Railway Club, St. Louis, Mo.

Railroad Hospitals on Ten Roads

Hundreds of surgeons devote their time to the health of railroad employees

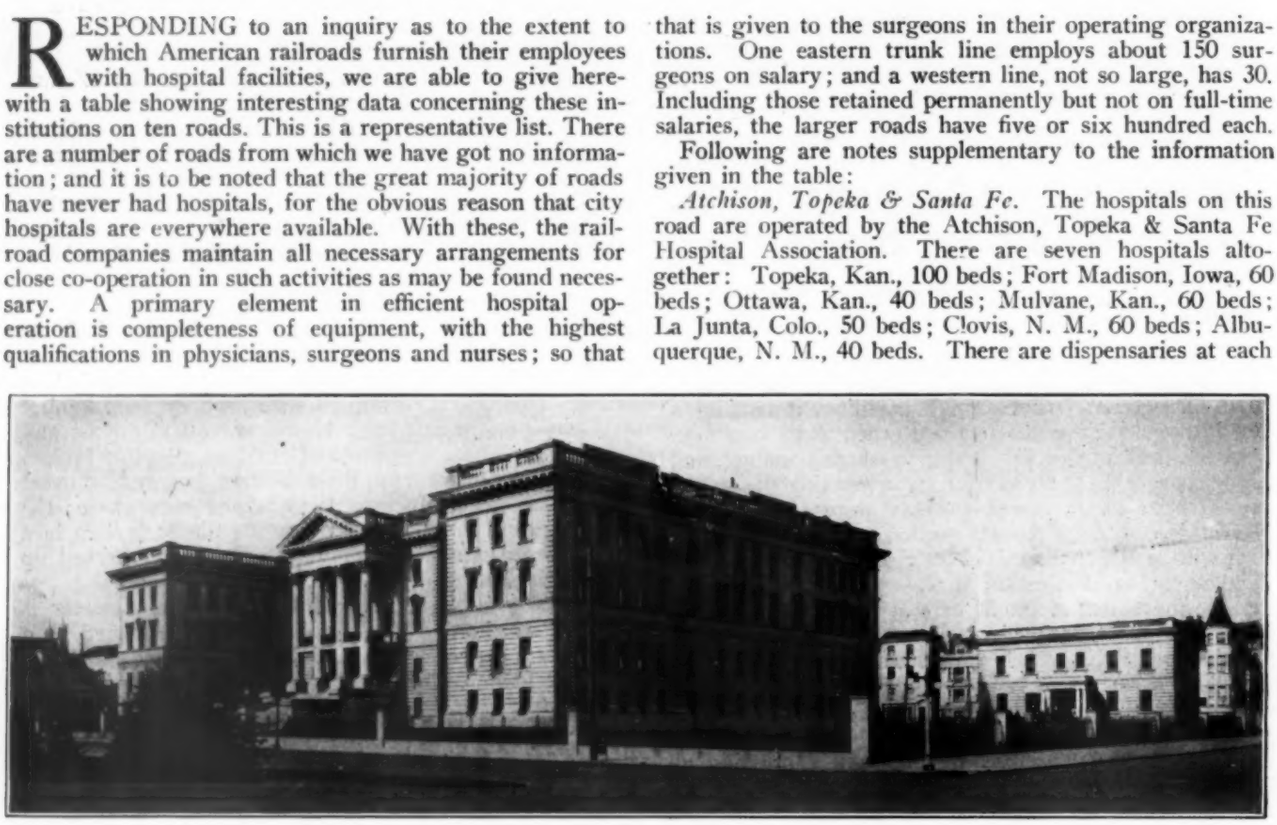
RESPONDING to an inquiry as to the extent to which American railroads furnish their employees with hospital facilities, we are able to give herewith a table showing interesting data concerning these institutions on ten roads. This is a representative list. There are a number of roads from which we have got no information; and it is to be noted that the great majority of roads have never had hospitals, for the obvious reason that city hospitals are everywhere available. With these, the railroad companies maintain all necessary arrangements for close co-operation in such activities as may be found necessary. A primary element in efficient hospital operation is completeness of equipment, with the highest qualifications in physicians, surgeons and nurses; so that a railroad company, even if it were to appropriate large sums for this service, would naturally combine its resources with those of the largest available hospital in any given locality. The railroads which have acted independently have done so primarily from necessity, because of the absence of other hospitals. All of these roads have extensive lines in thinly populated territory.

That the roads in the older and more populous states do not neglect this feature of their relations with their employees, is sufficiently indicated by the prominent place that is given to the surgeons in their operating organizations. One eastern trunk line employs about 150 surgeons on salary; and a western line, not so large, has 30. Including those retained permanently but not on full-time salaries, the larger roads have five or six hundred each.

Following are notes supplementary to the information given in the table:

Atchison, Topeka & Santa Fe. The hospitals on this road are operated by the Atchison, Topeka & Santa Fe Hospital Association. There are seven hospitals altogether: Topeka, Kan., 100 beds; Fort Madison, Iowa, 60 beds; Ottawa, Kan., 40 beds; Mulvane, Kan., 60 beds; La Junta, Colo., 50 beds; Clovis, N. M., 60 beds; Albuquerque, N. M., 40 beds. There are dispensaries at each hospital and also at the general offices of the road in Chicago and Topeka. First aid stations are maintained at all principal shops. Employees contribute to the support of the hospitals on the basis of their actual gross earnings each month; those earning $30 or less, 25 cents; the rate is 35 cents for those earning between $30 and $60; fifty cents between $60 and $100; and $1 for over $100.

Atlantic Coast Line. There are two hospitals, the second being at Rocky Mount, N. C., with 50 beds. The hospitals are run by the Relief Department, which



Southern Pacific General Hospital, San Francisco

Huntington Social Hall at the Right

HOSPITALS OPERATED BY AMERICAN RAILROADS, OR BY RAILROAD HOSPITAL ASSOCIATIONS

Road	Principal hospitals	Total beds all hospitals	Chief Surgeon	Number of surgeons		Patients treated in one year	
				On salary	Others	In hospitals	Dispensaries, etc.
Atchison, T. & S. F.	Topeka, Kan.	410	J. P. Kaster	62	208	3,874	{ 37,968 { 33,696
Atlantic C. L.	Waycross, Ga.	150	R. S. Slocum	7	....	1,299	8,665
Denver & R. G. W.	Salida, Col.	50	J. F. Rae	4	...	*31	.....
Duluth, M. & N.	Proctor, Minn.	20	E. E. Weber	4	12	†600	.....
Missouri Pacific	St. Louis, Mo.	300	P. F. Vasterling	14 ‡87	...	2,095	25,820
New Orleans G. N.	Bogalusa, La.	...					
St. Louis S. W.	Texarkana, Ark.	152	A. E. Chase	42	132	2,257	9,782
Southern Pacific	San Francisco, Cal.	250	F. K. Ainsworth	9 full time 135 part time	318	3,434	39,054 61,887
So. Pac. in Texas	Houston, Tex.	125	R. W. Knox	210	152	44,646	75,631
Texas & Pacific	Marshall, Tex.	100	J. A. Moore	4	141	2,527	.....
Wabash	Decatur, Ill.	155	M. P. Parrish	30	120	1,915	50,040

*Average daily. †Average. ‡Local.

is managed by an advisory committee of officers and employees. All employees of the road who are members of the Relief Department are entitled to free treatment, both in sickness and in accident cases. Dependent members of their families are treated at cost. The Atlantic Coast Line has first aid teams in its shops.

Denver & Rio Grande Western. The hospitals are managed by the Employees' Relief Association which is in charge of a board of trustees. The single hospital, at Salida, which represents an investment of about $70,000, is to be enlarged to a total capacity of 75 beds. About one-third of the patients are not railroad employees. Employees are treated free and other patients are charged regular hospital rates.

Duluth, Missabe & Northern. This company is a subsidiary of the United States Steel Corporation. The hospital, at Proctor, represents an investment of $60,000. The surgeons make outside visits numbering about 6,000 a year. Employees make regular monthly contributions to support the hospital and non-employees are received as pay patients. There is a dispensary at Duluth as well as at Proctor.

Missouri Pacific. The modern fireproof hospital at St. Louis, eight stories high and with a capacity of 300 beds, represents an investment of $1,000,000. The establishment is owned by the Missouri Pacific Hospital Association. There is one division hospital; and also 267 dispensaries and 24 emergency stations. The association has agreements with 33 other hospitals at various points on the line of the road. Regular salaried surgeons are employed at the dispensaries, and there are 94 specialists, dental surgeons, etc., on salary. Dependent members of the families of employees are admitted to the St. Louis hospital for surgical operations, payment being required at regular hospital rates. All officers and employees of the road pay regular assessments for the support of the hospital, entitling them to medical and surgical treatment.

New Orleans Great Northern. This hospital is operated in connection with the Great Southern Lumber Company, with which the railroad company is affiliated. Employees of the railroad are assessed at various rates; married men residing in Bogalusa, $2 a month; single men $1.80 a month; all those residing elsewhere, $1.80. Special rates are prescribed for those who work only part of the time. The railroad company also has arrangements for the service of local surgeons for employees residing outside of Bogalusa.

St. Louis-Southwestern. This hospital represents an investment of $190,000. Dispensaries are maintained at 16 points on the line of the road besides Texarkana. Of the 9,782 cases treated at these dispensaries, 3,973 were at Pine Bluff; 1,863 at Tyler and 1,394 at Texarkana.

Southern Pacific. The hospital department of this road is the oldest of which we have an account, the first building (at Sacramento, Cal.) having been built in 1869. The present establishment at San Francisco represents an investment of $1,000,000. There is a main building and two wings, four stories high; an employees' building, a power house, a social hall, and a laboratory. The annual cost of maintenance is about $500,000.

The Southern Pacific has 14 emergency hospitals at division terminals and shops. One of these hospitals has 24 beds and several visiting surgeons and specialists. At the smaller places a graduate nurse is in charge.

All officers and employees of the company are assessed 75 cents a month each, and in return enjoy the benefit of the hospital and also all necessary medical and surgical attention at residences, including X-ray service, artificial limbs, etc., when needed. No distinction is made between injuries sustained on duty and those happening when off duty. The railroad surgeons grant favorable rates to the families of employees.

Southern Pacific, Texas Lines. The large and handsome hospital building at Houston represents, including a nurses' home, an investment of $300,000. The company has contracts with hospitals at nine principal points in Louisiana and Texas, and maintains emergency hospitals at five other places. The first aid stations in the shops at San Antonio, Houston, El Paso, and Algiers have very complete equipment, and frequent lectures are given to the employees. Each station is in charge of an experienced trained nurse, and the employees have learned to apply for treatment immediately after sustaining an injury. The support of the hospital department is managed in the same way as on the lines of the Pacific System.

Texas & Pacific. The hospital at Marshall, with its capacity of 100 beds is also the central headquarters for numerous dispensaries which have filled as many as 42,607 prescriptions in a month.

Wabash. There are three hospitals. One at Decatur, Ill., 80 beds; one at Peru, Ind., 35 beds; and one at Moberly, Mo., 40 beds. The management is by the Employees' Hospital Association.

P. & A. **Baltimore & Ohio Mountain Type Locomotive on Public View at Baltimore**

General News Department

The Erie has petitioned the Interstate Commerce Commission for a further extension of time until January 1, 1926, in which to complete the train control installation ordered by the commission.

The New York Transit Commission has issued an order authorizing the Pennsylvania to increase by about $420,000 per annum the rental charged its subsidiary, the Long Island, for use of the Pennsylvania station, New York.

The Brotherhood of Locomotive Firemen and Enginemen in convention at Detroit, Mich., has authorized the erection of a general headquarters building at Cleveland, Ohio. D. D. Robertson, president of the brotherhood, and all other general officers, were re-elected.

The Commission, through its Bureau of Service, in co-operation with the Department of Agriculture, is about ready to make an investigation with regard to body icing of perishables in transit. The main object of the investigation is to determine the value of, and necessity for body icing in the shipment of certain types of perishables, the effect of this practice on the equipment, and the means of obviating any deleterious effects on the equipment from this practice.

Employees of the National Railways of Mexico, who have been outspokenly dissatisfied with the government's economy measures in the operation of the railways, have been warned by President Calles that in the event of a strike the strikers will be vigorously prosecuted and any violence suppressed by the army. The government in its efforts to make the railways pay their way have reduced the forces in some instances as much as 50 per cent and have effected similar reductions in the wages of the employees retained.

The Southern Hardwood Traffic Association has filed a protest with the Southern Freight Association against the proposed advance of one cent per hundred pounds in the rates on lumber to Detroit, Toledo and other cities in that vicinity from points on the Yazoo & Mississippi Valley and the Columbus & Greenville. The action follows the approval by carriers and the Southern Freight Association of rates representing a reduction of approximately 12 cents per hundred pounds on mahogany lumber from New Orleans; the reduced rates on barrels from Ohio and Mississippi river territory to southeastern points, which will become effective August 1 and the publication of reduced rates on logs from points on the Louisville & Nashville in Kentucky to stations on the Pennsylvania between Louisville and Indianapolis which are effective July 25.

D. T. & I. Employee-Investors Receive 16 Per Cent Interest

For the second successive six-month period, the Detroit, Toledo & Ironton savings certificates, of which the employees own $352,000 worth, will bear 8 per cent interest, making the yearly return on the basis of 16 per cent.

Conference on Peace River Facilities

Following two or three conferences Sir Henry Thornton, president of the Canadian National, last week submitted in Ottawa to Premier Herbert Greenfield of Alberta a memorandum showing what the government railway was prepared to do toward solving the problem of improved facilities in the Peace river region in northwestern Alberta. Premier Greenfield is already in possession of the Canadian Pacific's proposal, and on his return home will present the two offers to his government and then call a session of the Legislature to finally decide the question. The Premier is anxious to get the matter settled this summer so that the Peace river settlers may get the advantage of whatever provisions are made for the movement of what promises to be their record crop this fall. A central factor in the situation is the future control of the Edmonton, Dunvegan & British Columbia, running from Edmonton to the Peace river country. The present lease of that line, which is owned by the Alberta government, by the Canadian Pacific expires on July 20, subject to three months' notice, which really gives until October 20 to reach a final solution of the problem. Premier Greenfield's immediate concern is some adjustment of freight rates on the line for this year's business, so that whatever form of lease is entered into by the Alberta government is certain to stipulate maximum rates for the commodities of movement to and from the Peace river country.

All D. T. & I. Employees Given Badges

For ready identification and to assist in keeping trespassers off the company property, badges have been issued by the Detroit, Toledo & Ironton to all employees, who must wear them at all times when on duty or on the company property. A value of $5 is placed on the badges, which amount is deducted from the wages of any employee whose badge is lost. No employees except agents are authorized to deliver or take up employees' badges. Agents are held responsible to the extent of $5 for failure to secure their badges before delivery of pay checks to employees not having worked one day subsequent to the pay period.

Railways' Land Ownership Problem in Chicago River Alteration

Suggestions for the solution of the problems of land ownership arising from the proposed straightening of the Chicago river and the construction in Chicago of a passenger terminal to accommodate the railways now using the LaSalle street, Dearborn street and Grand Central stations, were presented by a committee of Chicago business men, of which Silas Strawn, attorney, is chairman, to a committee of presidents of the railways involved in Chicago on July 3. The suggestions are now being considered by the presidents' committee and their views on them will be disclosed at another joint meeting in Chicago on July 17.

Pullman Company Names Car for Porter Hero

The Pullman Company has named one of its cars after Oscar J. Daniels, a porter, who lost his life in the derailment on June 16 on the Delaware, Lackawanna & Western of an excursion train from Chicago to New York near Hackettstown, N. J. In consideration of valorous work in rescuing and attending the injured, a conductor and three porters of the Pullman Company were given stock by the company. The car in which Daniels rode at the time of the wreck lodged alongside the locomotive in such a manner that steam escaping from the locomotive entered the car through a door which was thrown open. In order to save the passengers, Daniels worked his way through the steam to the door and closed it.

Chicago, Burlington & Quincy Uses Amateur Motion Pictures

The Chicago, Burlington & Quincy is now using the amateur motion picture camera as a means of instruction for employees as the result of a test made in March, 1925. This company purchased one of the amateur cameras to aid in freight claim prevention work but after realizing the ease with which it could be adapted to other conditions has since used it for other purposes as well. The road has found that the pictures when displayed for employees hold their interest and impress them better than any other method. The pictures are designed to arouse interest and to bring about this end pictures are taken of employees who perform their work well and are displayed as an example to others. To further increase the employees' interest, scenic pictures of the country along the system and pictures showing efficient methods of handling business have been taken and are shown

(*Continued on page* 111)

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1925

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or less).	Net after rents.	Net after rents, 1924.
Akron, Canton & Youngstown	May	171	$262,510	$444	$272,245	$35,189	$25,043	$10,902	$67,240	$10,995	$149,356	54.90	$122,889	$108,755	$73,178	$36,539
	5 mos.	171	1,157,933	2,319	1,216,124	171,658	125,891	54,575	336,424	55,794	744,329	61.20	471,795	404,964	240,258	260,950
Alabama & Vicksburg	May	141	209,687	56,434	288,104	37,434	47,771	10,487	94,133	14,392	194,154	67.40	93,950	67,078	73,222	37,045
	5 mos.	141	1,039,572	275,703	1,421,790	184,561	241,498	50,205	477,178	72,638	1,023,791	72.00	397,999	256,770	286,547	194,582
Vicksburg, Shreveport & Pacific	May	188	252,926	66,071	341,749	49,868	52,680	11,419	122,492	15,500	254,022	74.30	87,727	65,299	58,569	48,622
	5 mos.	188	1,200,561	310,172	1,623,544	271,453	275,267	58,961	617,202	81,055	1,314,102	80.90	309,442	173,348	123,490	137,190
Ann Arbor	May	293	432,796	22,856	471,802	53,390	82,542	9,894	167,077	14,445	327,348	69.40	144,454	123,421	123,490	48,733
	5 mos.	293	2,053,439	132,927	2,265,718	178,189	4,300,047	50,659	948,600	75,455	1,682,950	74.30	582,768	489,495	403,127	185,373
Atchison, Topeka & Santa Fe	May	9,186	9,886,098	3,277,530	14,404,100	2,658,395	3,346,188	346,548	4,827,943	379,634	11,493,890	79.80	2,910,210	1,965,027	1,957,397	1,553,133
	5 mos.	9,184	50,380,173	15,769,384	72,470,457	10,767,926	16,830,707	1,697,256	24,659,048	1,950,652	55,804,061	77.00	16,666,396	11,079,499	10,898,239	10,022,049
Gulf, Colorado & Santa Fe	May	1,908	1,627,421	288,554	2,030,124	465,713	535,158	48,602	695,555	63,209	1,807,548	89.00	222,576	134,207	5,086	—76,636
	5 mos.	1,908	9,235,531	1,314,581	11,197,367	2,503,120	2,583,747	250,630	3,625,352	333,449	9,294,102	83.00	1,903,265	1,466,847	825,828	—114,091
Panhandle & Santa Fe	May	858	567,649	129,306	739,463	163,725	188,284	8,561	242,681	17,578	619,905	83.80	119,558	99,524	47,046	—38,673
	5 os.	858	3,230,379	536,505	4,009,296	790,806	919,711	42,380	1,217,354	93,380	3,061,104	76.40	948,192	806,150	537,767	339,018
Atlanta & West Point	May	93	142,503	67,192	243,313	24,187	48,154	10,986	85,694	9,887	185,139	76.00	58,174	40,678	29,929	3,754
	5 mos.	93	754,418	342,208	1,262,771	152,151	226,201	50,647	478,701	52,086	984,897	77.90	277,874	201,032	144,174	129,979
Western of Alabama	May	133	163,470	63,242	253,506	26,219	50,722	11,855	73,842	9,966	178,272	70.30	75,234	60,979	58,086	31,093
	5 mos.	133	908,541	319,776	1,359,455	177,752	254,795	54,799	407,272	52,631	969,934	71.30	389,521	308,705	283,756	250,542
Atlanta, Birmingham & Atlantic	May	639	328,084	35,854	394,266	80,731	93,136	24,155	161,010	16,566	375,655	95.30	18,611	5,460	—16,570	3,353
	5 mos.	639	1,835,881	185,464	2,182,526	417,074	484,379	116,028	873,706	83,119	1,974,615	90.50	207,911	142,344	—1,360	28,926
Atlantic Coast Line	May	4,889	5,457,097	1,314,714	7,380,030	878,493	1,598,804	137,476	2,502,394	160,279	5,321,605	72.10	2,058,425	1,555,462	1,306,376	1,516,199
	5 mos.	4,879	28,664,152	9,346,688	41,082,812	4,397,786	7,022,846	707,145	13,394,834	773,157	26,580,278	64.70	14,502,534	11,943,701	10,722,201	9,838,496
Charleston & Western Carolina	May	342	290,105	24,086	330,166	80,036	46,908	8,804	137,750	8,480	281,960	88.40	48,206	28,144	—4,518	12,340
	5 mos.	342	1,624,965	124,994	1,828,748	296,715	215,884	36,429	721,399	33,857	1,304,266	71.30	524,482	424,167	332,434	166,341
Baltimore & Ohio	May	5,292	15,151,693	2,261,040	18,687,410	2,150,991	4,381,223	381,247	6,652,533	507,885	14,248,007	76.20	4,439,403	3,592,591	3,184,866	3,389,509
	5 mos.	5,292	73,936,499	10,740,013	90,901,961	10,753,180	22,345,349	1,881,475	34,219,510	2,574,890	72,567,206	79.80	18,334,755	14,097,832	12,379,808	12,624,811
Baltimore & Ohio Chicago Term	May	80	.....	.....	301,448	43,141	16,245	1,835	155,012	10,415	231,226	76.70	70,222	27,394	124,253	7,145
	5 mos.	80	.....	.....	1,441,859	174,890	183,925	9,617	830,618	54,576	1,275,937	88.50	1,659,922	—36,008	429,822	—38,829
Staten Island Rapid Transit	May	23	98,771	114,780	245,899	44,301	32,470	7,768	125,885	14,480	218,904	89.00	26,995	10,986	—4,112	—25,819
	5 mos.	23	479,868	515,655	1,105,147	214,519	155,817	9,524	621,319	71,964	1,073,143	97.10	32,004	—46,087	—120,925	—106,019
Bangor & Aroostook	May	616	550,906	40,737	615,894	101,816	114,609	5,869	148,711	22,170	395,168	64.10	220,726	163,789	183,209	77,831
	5 mos.	616	2,992,710	306,800	3,430,306	535,512	599,265	25,162	897,098	110,937	2,174,915	63.40	1,255,391	951,881	1,051,483	948,141
Belt Ry. Co. of Chicago	May	32	.....	.....	550,489	71,901	55,724	3,172	237,024	13,910	381,731	69.30	168,758	124,184	129,880	135,657
	5 mos.	32	.....	.....	2,770,416	234,387	306,493	16,016	1,330,700	53,505	1,941,101	70.10	829,315	619,129	637,968	684,004
Bessemer & Lake Erie	May	228	1,683,530	15,266	1,728,174	133,670	363,374	15,641	405,558	30,273	943,006	54.60	785,168	680,588	656,247	500,431
	5 mos.	228	5,520,853	87,456	5,404,929	448,333	1,845,889	77,362	1,562,174	152,319	4,053,494	75.00	1,351,435	1,123,962	1,316,586	382,471
Bingham & Garfield	May	33	46,464	.....	48,122	10,892	9,380	1,224	12,702	4,661	39,005	81.10	9,117	—669	10,870	18,462
	5 mos.	33	250,690	238	256,885	44,156	44,116	7,321	70,393	23,767	190,741	74.30	66,144	13,257	75,509	70328
Boston & Maine	May	2,271	4,099,127	1,430,652	6,305,334	876,680	1,306,481	61,803	2,585,830	234,445	5,083,493	80.60	1,221,841	965,337	719,956	552,273
	5 mos.	2,271	19,949,062	7,832,736	31,634,129	4,250,400	6,629,076	297,212	13,516,186	1,195,407	25,992,355	82.20	5,641,774	4,343,763	3,251,053	2,642,557
Brooklyn Eastern District Term	May	9	111,462	.....	117,975	9,334	12,992	213	41,805	5,153	69,497	58.90	48,478	41,257	42,517	43,002
	5 mos.	9	550,871	.....	585,283	36,574	73,563	1,596	210,230	26,445	348,408	59.50	236,875	201,118	204,908	214,364
Buffalo & Susquehanna R. R.	May	253	88,541	3,200	96,055	29,933	38,411	1,732	33,098	9,496	112,670	117.30	—16,615	—20,015	—4,904	—2,829
	5 mos.	253	707,757	23,643	748,994	155,880	282,542	9,402	237,695	48,612	734,131	98.10	14,863	—2,137	125,098	103,955
Buffalo, Rochester & Pittsburgh	May	590	985,532	108,882	1,156,192	132,462	341,905	26,673	476,480	40,407	1,020,166	88.20	136,026	100,876	111,746	218,602
	5 mos.	590	5,166,065	602,161	6,094,192	630,656	1,816,536	131,911	2,484,668	204,113	5,279,524	86.60	814,668	639,504	738,769	710,638
Canadian Pacific Lines in Maine	May	233	94,951	20,952	131,048	94,720	47,307	4,645	72,910	4,434	224,016	170.90	—92,968	—103,968	—114,508	—90,902
	5 mos.	233	998,659	150,237	1,226,587	262,024	259,799	23,195	524,385	20,124	1,089,527	88.80	137,060	82,060	22,699	157,918
Central of Georgia	May	1,920	1,590,185	408,652	2,218,563	386,996	425,011	70,783	841,079	94,236	1,811,698	81.70	406,865	308,771	276,613	252,652
	5 mos.	1,920	8,357,499	2,329,843	11,882,182	1,921,663	2,137,131	344,406	4,397,175	464,731	9,270,421	78.00	2,611,761	2,078,704	1,858,583	1,901,740
Central of New Jersey	May	692	3,877,876	745,293	4,906,111	591,860	992,802	41,530	1,810,893	107,916	3,565,018	72.70	1,341,093	949,687	822,010	611,517
	5 mos.	692	17,746,923	3,491,203	22,778,319	2,477,473	5,081,393	189,603	8,809,987	545,725	17,203,425	75.50	5,574,894	3,757,772	3,175,361	1,495,277
Cenetral Vermont	May	434	572,158	96,897	747,102	325,208	133,285	14,281	320,958	22,472	817,694	109.40	—70,592	—90,033	—108,542	34,632
	5 mos.	434	2,509,298	515,284	3,341,747	872,483	626,128	70,135	1,600,149	121,274	3,298,046	98.70	43,701	—52,319	—132,719	70,648
Chesapeake & Ohio	May	2,600	9,041,675	785,487	10,276,494	1,329,579	2,808,947	117,838	2,743,438	222,972	7,260,393	70.70	3,016,101	2,526,326	2,797,697	1,966,231
	5 mos.	2,599	40,011,911	3,826,388	45,988,229	6,659,670	12,505,261	527,773	13,790,989	1,118,115	34,769,422	75.60	11,218,807	8,970,027	9,887,301	8,914,957
Chicago & Alton	May	1,055	1,646,121	528,210	2,405,355	409,865	500,583	64,424	866,945	55,901	1,897,812	78.90	507,543	408,194	252,051	230,389
	5 mos.	1,055	8,341,432	2,438,342	11,915,116	1,370,487	2,823,061	318,820	4,607,280	281,550	9,415,690	79.00	2,499,226	2,001,684	1,285,657	1,511,257
Chicago & Eastern Illinois	May	945	1,448,709	354,894	1,971,007	212,438	599,588	59,700	768,440	66,759	1,719,834	87.30	251,173	145,375	32,514	—102,639
	5 mos.	945	7,724,551	1,754,558	10,321,924	992,460	3,234,905	290,018	4,160,793	344,144	9,102,768	88.20	1,219,156	700,566	266,642	323,968
Chicago & Northwestern	May	8,462	8,240,290	2,056,715	11,643,091	1,693,926	1,987,792	168,068	4,551,694	342,108	8,810,984	75.70	2,832,107	2,026,318	2,011,300	388,652
	5 mos.	8,462	38,647,947	10,215,839	55,165,477	6,738,739	12,625,876	816,096	23,572,104	1,747,486	45,774,723	83.00	9,390,754	5,372,551	4,659,979	4,142,320
Chicago, Burlington & Quincy	May	9,396	8,322,531	1,779,069	11,244,364	1,991,554	2,527,369	258,465	4,240,902	360,421	9,436,474	83.90	1,807,890	1,093,273	893,525	1,002,352
	5 mos.	9,396	44,353,591	9,143,004	59,643,026	6,750,486	14,771,742	1,216,435	22,579,053	1,812,764	47,425,948	79.50	12,217,078	8,248,675	7,167,436	8,907,531
Chicago Great Western	May	1,496	1,412,212	252,384	1,827,024	398,396	440,350	67,608	765,151	56,293	1,738,601	95.20	88,423	9,880	—96,130	35,516
	5 mos.	1,496	7,138,354	1,381,793	9,320,122	1,241,848	2,151,457	342,457	4,009,981	277,744	8,093,212	86.70	1,236,910	830,574	254,677	498,673
Chicago, Indianapolis & Louisville	May	649	1,023,647	298,364	1,474,127	144,765	288,873	33,920	510,554	33,092	1,033,848	70.10	440,279	360,452	228,374	125,703
	5 mos.	649	5,125,000	1,174,442	6,987,570	671,976	1,463,686	172,413	2,549,272	269,864	5,105,637	73.10	1,881,933	1,533,281	941,016	757,309

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or less).	Net after rents.	Net after rents, 1924.
Chicago, Milwaukee & St. Paul	May	11,205	$9,228,129	$1,454,948	$11,921,557	$2,484,487	$3,319,780	$196,169	$4,708,635	$328,459	$11,093,464	93.10	$828,093	$74,260	—$315,109	$365,034
	5 mos.	11,204	46,612,049	7,521,391	60,333,731	8,176,876	15,707,039	955,235	24,906,456	1,721,537	51,709,284	85.70	8,624,447	4,843,303	2,951,593	3,140,663
Chicago, Peoria & St. Louis	May	215	57,725	6,509	70,391	15,525	11,280	1,135	36,547	8,122	72,609	103.20	—2,218	—4,968	—16,356	—30,563
	5 mos.	234	374,116	46,337	459,362	76,283	85,833	7,687	234,054	41,174	445,031	96.90	14,331	—1,433	—100,091	—119,185
Chicago River & Indiana	May	19	.....	.....	545,767	106,052	93,453	861	2 06,016	12,488	418,870	76.70	126,899	90,772	200,832	223,266
	5 mos.	19	.....	.....	2,821,593	374,839	425,350	4,093	1,136,722	62,975	2,003,979	71.00	817,614	620,644	1,166,235	1,346,628
Chicago, Rock Island & Pacific	May	7,578	6,674,285	1,829,634	9,285,328	1,314,983	2,405,753	223,044	3,824,489	306,294	8,137,565	87.60	1,147,663	619,082	173,794	20,785
	5 mos.	7,578	34,853,882	9,256,501	47.839,566	5,486,390	11,622,090	1,091,641	19,624,650	1,482,512	39,471,322	82.60	8,368,244	5,733,199	3,791,322	3,528,192
Chicago, Rock Island & Gulf	May	461	332,496	59,775	430,056	64,335	74,549	17,841	202,911	16,379	381,412	88.70	48,644	35,723	7,927	55,579
	5 mos.	461	1,871,536	361,071	2,449,415	339,985	348,398	79,715	1,067,228	82,865	1,938,094	79.10	511,321	446,679	329,188	392,540
Chic. St. Paul, Minn. & Omaha	May	1,749	1,362,429	347,633	1,855,396	320,378	398,620	28,213	874,877	80,482	1,709,490	92.10	145,906	24,445	—27,879	10,060
	5 mos.	1,749	7,461,559	2,078,439	10,303,679	1,151,248	2,085.027	142,666	4,726,071	380,903	8,525,153	82.70	1,778,526	1,156,940	861,359	1,014,935
Cinn., Indianapolis & Western	May	347	331,942	30,692	387,768	63,775	69,987	16,028	159,036	18,237	328,098	84.60	59,670	42,144	17,942	—1,528
	5 mos.	347	1,616,971	144,368	1,906,020	221,169	391,633	78,243	816,728	88,636	1,600,990	84.00	305,030	213,873	74,101	63,379
Clinchfield Railroad	May	309	675,603	29,796	720,367	91,017	167,109	24,786	143,556	18,781	442,843	61.50	277,524	222,519	257,131	211,040
	5 mos.	309	3,468,346	156,679	3.695,051	396,635	957,735	124,385	765,484	99,737	2,337,606	63.30	1,357,445	1,082,421	1,400,158	1,027,847
Colorado & Southern	May	1,056	689,508	107,709	905.644	173,649	212,713	14,019	355,433	40,844	801,465	88.50	104,179	39,654	33,269	—3,054
	5 mos.	1,056	3,658,337	557,168	4,629,298	634,348	1,156,553	66,085	1,834,574	204,595	3,925,542	84.80	703,756	383,915	346,691	442,496
Ft. Worth & Denver City	May	455	558,135	152,486	789,428	106,217	190,436	19,550	238,116	38,641	598,557	75.80	190,871	131,633	129,328	174,901
	5 mos.	455	3,294,990	756,731	4,345,821	405,005	915,312	72,432	1,373,820	177,418	2,971,207	68.40	1,374,614	1,077,539	1,107,598	1,059,396
Wichita Valley	May	271	74,013	19,801	101,337	16,318	11,313	48	37,282	1,935	65,873	65.00	35,464	24,834	7,072	27,990
	5 mos.	271	502,377	103,930	649.649	123,646	41,201	241	220,535	8,834	389,950	60.00	259,699	207,134	110,901	208,131
Columbia & Greenville	May	167	86,361	20,799	113,916	40,302	14,165	2,757	43,629	10,129	110,720	97.20	3,196	877	—8,955	2,792
	5 mos.	167	471,343	117,732	625,355	232,817	82,385	13,525	230,143	49,905	607,390	97.10	17,965	8,535	—44,720	43,881
Delaware & Hudson	May	881	3,408,166	228,021	3,929,574	419,363	926,088	51,813	1,331,958	142,378	2,898,415	73.80	1,031,159	918,725	946,755	585,093
	5 mos.	886	15,914,971	1,284,196	18,474,328	2,213,026	4,904,810	245,399	6,861,182	712,224	15,085,295	81.70	3,389,033	2,826,071	2,942,297	1,965,831
Delaware Lackawanna & Western	May	992	5,595,922	1,092,095	7,527,123	810,531	1,495,673	129,999	2,733,006	164,795	5,383,749	71.50	2,143,374	1,513,120	1,576,026	1,545,440
	5 mos.	992	26,494,217	5,230,772	35.831,329	3,298,852	7,935,933	607,257	14,035,872	819,722	26,947,474	75.20	8,883,855	6,009,853	6,124,544	5,940,097
Denver & Rio Grande Western	May	2,577	1,791,156	330,668	2,326,033	441,499	447,903	61,524	736,906	82,723	1,818,756	78.20	507,277	339,208	372,670	174,008
	5 mos.	2,568	9,219,355	1,643,043	11,803,128	1,991,930	2,481,021	253,291	4,033,742	434,869	9,366,951	79.40	2,436,177	1,593,815	1,793,243	1,425,335
Denver & Salt Lake	May	255	191,414	21,416	232,785	67,540	77,109	1,184	51,425	6,321	203,579	87.50	29,206	20,193	28,001	15,335
	5 mos.	255	920.206	113,155	1,135.243	225,613	431,249	6,039	337,626	31,229	1,031,756	90.90	103,487	58,365	74,101	—69,260
Detroit & Mackinac	May	375	119,058	15,265	148,405	37,333	39,853	2,328	53,752	5,245	138,233	93.10	10,172	324	10,455	20,131
	5 mos.	375	490,591	105,143	656.381	118,837	180,229	10,617	270,622	29,106	608,986	92.80	47,395	—2,982	63,820	89,026
Detroit & Toledo Shore Line	May	61	312,664	.....	316,485	61,369	41,852	2,817	74,973	7,552	188,563	59.60	127,922	107,328	36,852	—27,809
	5 mos.	61	1,541.979	.....	1,570.481	182,784	179,804	14,280	436,167	40,864	853,899	54.40	716,582	605,065	224,082	74,222
Detroit Terminal	May	26	.....	.....	233,152	35,012	18,841	.....	103,657	1,721	159,231	68.30	73,921	52,452	80,127	58,681
	5 mos.	26	.....	.....	986,807	95,623	75,542	80	481,735	9,724	662,704	67.20	324,103	225,722	292,092	282,227
Detroit, Toledo & Ironton	May	470	1,227,948	7,502	1,247,994	192,907	188,867	7,238	296,415	26,294	710,983	57.00	537,011	490,209	377,606	158,812
	5 mos.	470	5,473,500	34,138	5,586.469	811,153	880,796	41,914	1,481,791	134,409	3.333,808	59.70	2,252.661	2,007,852	1,504,211	1,411,262
Duluth & Iron Range	May	276	900,784	4,428	992,590	151,651	116,610	1,418	216,729	19,191	505,888	51.00	486,702	421,892	426,497	308,463
	5 mos.	276	1,626,655	35,507	1,825,474	416,233	590,000	6,085	691,385	91,959	1,797,495	98.50	27,979	—99,359	—87,835	—424,251
Duluth, Missable & Northern	May	305	2,622,802	6,450	2,860,385	279,426	212,021	2,339	395,003	20,872	911,312	31.90	1,949,073	1,578,228	1,572,037	1,246,387
	5 mos.	305	3,752,940	39,024	4.139,976	737,924	952.195	15,812	1,036,471	105,509	2.851,371	68.90	1,288,605	609,668	579,561	—482,585
Duluth, Winnipeg & Pacific	May	178	156,198	9,169	170.724	45,555	36,018	4,657	65,586	6,598	158,904	93.10	11,820	2.930	1,398	—20,095
	5 mos.	178	925,074	58,705	1.012.929	144,239	186,860	21.146	384.476	37,440	776,586	76.70	236,343	185.898	201,223	195,304
Elgin, Joliet & Eastern	May	459	1,829,011	28	2.005,575	229,001	418,028	12,239	685,995	48,264	1,393,154	69.50	612,421	524,780	327,483	169,360
	5 mos.	459	9,985,787	96	10,982.611	855,788	2,468.867	64,100	3,851,773	216,488	7.456.096	67.90	3,526,515	3,086,883	1,990,475	1,599,856
Erie R. R.	May	2,055	7,182,835	1,071.782	8,962.485	1,073,710	2,212,395	147,171	3,453,013	302,651	7,220.444	80.60	1,742,041	1,368,188	1,370,316	1,065,478
	5 mos.	2,055	32,852,645	5,084,871	41,366,977	4,847,603	11,136,449	748,168	17,150,141	1,455,667	35,529,976	85.90	5,837,001	4,028.929	4,470,148	5,821,525
Chicago & Erie	May	269	907,377	64,569	1.058,720	117,201	125,797	21,774	345,845	38,847	649.552	61.40	409,168	352,403	89,574	171,935
	5 mos.	269	5,009.219	270,519	5.722,197	577.334	711,745	117,762	1,906,269	193,959	3.506,983	61.30	2,215.214	1,941,159	565,371	451,072
New Jersey & New York	May	45	25,310	107,814	138,163	17,943	21,746	1,648	72,787	4,946	119,068	86.20	19,095	15,395	—16,326	—2,930
	5 mos.	45	124,170	507.860	655,546	87,905	116,952	6,900	370,429	21,311	603,495	92.10	52,051	33,861	—120,002	—63,929
N. Y., Susquehanna & Western	May	135	349,767	56,971	450,887	52,573	57,957	4,671	201,281	12,294	328,672	72.80	122,215	92,023	77,923	32,577
	5 mos.	135	1,551,887	282,974	2.052.356	230,284	302,905	20,575	1,033,228	56,504	1,643,338	80.10	409,018	264,796	188,168	—131,826
Ev'sville, Indianapolis & Terre Haute	May	146	168,626	3,234	177,934	27,842	25,933	1,688	63,758	4,357	123,578	69.50	54,356	49,272	19,788	—1,065
	5 mos.	146	910,461	19,320	963,469	127,168	165,549	8,898	323,310	20,752	645,469	67.00	318,000	282,328	186,325	70,667
Florida East Coast	May	770	1,379,407	459,829	2,111,273	307,125	289,352	17.990	749,383	41,685	1,423,141	67.40	688,132	572,592	406,562	393,121
	5 mos.	770	6,744.161	3,949,145	12.091,952	1,584,643	1,404,144	109,336	4,379,689	196,255	7.835,813	64.80	4,256,139	3.680,164	2,803,232	2,934,920
Fort Smith & Western	May	249	105.655	14,331	127,449	24,717	26,031	4,944	42,564	7,544	104,714	82.20	22,735	17,223	3,121	2,539
	5 mos.	249	600,106	81,518	724,984	121,182	127,171	26,333	232,241	38,005	546,376	75.40	178,608	150,894	80,548	—29,514
Galveston Wharf Co.	May	13	.....	.....	109,099	53,018	4,523	727	29,425	2,586	96,270	88.20	12,829	—6,080	—6,477	—13,610
	5 mos.	13	.....	.....	752.919	251.520	19,965	4.474	188,413	13.484	516,500	68.60	236,419	149,467	148,308	—3,183
Georgia R. R.	May	328	353,528	81,611	468 081	52.788	105,361	24,262	196,856	20,774	400,298	85.50	67,783	60,727	61,111	22,445
	5 mos.	328	1,859,927	424,374	2.468,878	278 409	510,461	115.347	1,042,008	102,344	2,048.146	83.00	420,732	368,616	335,655	349,751
Georgia & Florida	May	406	102,256	16,768	125,555	17,496	12,254	6,945	48,951	6,998	92,865	74.40	32,690	26,137	9,690	12,481
	5 mos.	406	542,386	72,619	650,910	94,710	79,644	37,953	256,779	36,815	507,005	77.90	143,905	111,057	31,766	79,758

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or less).	Net after rents.	Net after rents, 1924.
Grand Trunk Western ..... May	347	$1,378,461	$148,078	$1,626,115	$239,475	$371,357	$40,202	$553,329	$53,865	$1,267,454	77.90	$358,661	$296,403	$164,745	—$108,327
5 mos.	347	6,031,365	744,706	7,182,826	749,369	1,881,986	182,031	2,777,391	269,397	5,898,169	82.10	1,284,657	936,909	212,911	14,321
Atlantic & St. Lawrence ..... May	166	141,503	28,705	193,269	88,067	34,272	6,200	90,733	10,095	230,886	119.40	—37,617	—52,248	—108,127	—183,150
5 mos.	166	868,789	149,579	1,100,847	222,688	172,464	27,994	591,860	41,927	1,065,697	96.80	35,150	—46,028	—377,648	—557,068
Chic., Det. & Canada Gr. Tr. Jct. May	59	186,622	3,036	225,094	43,583	11,299	4,398	80,237	3,297	142,805	63.40	82,289	74,265	47,470	46,237
5 mos.	59	1,070,834	20,679	1,295,413	111,224	61,601	20,262	402,132	17,429	612,611	47.30	682,802	623,535	480,054	509,016
Det. Grand Haven & Milwaukee. May	189	553,335	28,869	628,462	85,916	49,526	11,970	236,900	16,467	400,740	63.80	227,722	223,762	132,877	54,763
5 mos.	189	2,229,209	140,185	2,605,002	265,992	248,883	54,691	1,186,851	83,921	1,839,287	70.60	765,715	741,557	286,310	242,699
Great Northern ..... May	8,252	6,804,806	940,518	8,654,371	1,731,986	1,358,710	220,794	2,878,268	238,538	6,481,300	74.90	2,173,071	1,354,059	1,370,268	1,062,075
5 mos.	8,251	28,369,141	4,923,933	37,053,199	5,495,531	6,676,431	878,827	14,519,705	1,124,185	29,067,710	78.40	7,985,489	4,277,713	4,484,635	3,887,201
Green Bay & Western ..... May	234	97,572	4,872	107,851	25,234	14,559	4,254	44,387	2,861	91,279	84.60	16,572	9,072	4,272	7,360
5 mos.	234	508,873	47,012	594,262	111,187	81,424	20,101	226,347	13,932	452,957	76.20	141,305	103,805	72,005	88,426
Gulf & Ship Island ..... May	307	207,272	39,391	276,732	57,507	43,435	8,269	84,886	14,612	220,572	79.70	56,160	31,811	25,293	70,193
5 mos.	307	1,167,186	188,785	1,509,615	229,823	222,371	38,787	427,124	77,833	1,054,338	69.90	454,677	318,650	248,317	280,922
Gulf, Mobile & Northern ..... May	465	431,235	29,276	482,168	75,012	81,824	22,582	142,220	25,791	347,924	72.16	134,244	103,686	95,622	108,377
5 mos.	465	2,305,095	166,072	2,574,920	393,864	457,510	108,968	762,484	126,903	1,851,713	71.91	723,207	568,501	504,153	518,451
Hocking Valley ..... May	348	1,529,292	62,726	1,774,387	194,218	427,671	14,421	514,499	39,891	1,189,780	67.10	584,607	482,093	405,676	269,461
5 mos.	348	6,228,557	314,920	7,060,248	730,219	2,152,044	70,857	2,165,513	199,153	5,316,282	75.30	1,743,966	1,240,133	1,268,472	1,361,465
Illinois Central ..... May	4,875	9,383,963	1,837,267	12,321,777	1,836,172	2,982,378	191,537	4,385,262	320,617	9,658,409	78.40	2,663,368	1,891,936	1,937,248	1,646,607
5 mos.	4,875	45,878,083	10,044,361	61,040,093	8,056,040	13,598,208	1,075,706	22,507,252	1,617,197	47,021,035	77.00	14,019,058	9,499,790	9,795,147	10,961,513
Yazoo & Mississippi Valley ..... May	1,380	1,422,727	241,546	1,774,131	252,802	343,108	30,202	678,933	48,395	344,754	75.80	429,377	300,582	260,634	326,565
5 mos.	1,380	7,367,259	1,313,238	9,197,258	1,385,087	1,566,201	145,394	3,401,154	237,329	6,708,121	72.90	2,489,137	1,845,792	1,676,178	1,536,418
Illinois Central Combined Report ... May	6,225	10,806,690	2,078,813	14,095,908	2,088,974	3,325,486	221,739	5,664,195	369,012	11,003,163	78.10	3,092,745	2,192,518	2,197,882	1,973,172
5 mos.	6,255	53,245,342	11,357,599	70,237,351	9,441,127	15,164,409	1,221,100	25,908,406	1,854,526	53,729,156	76.50	16,508,195	11,345,582	11,471,325	12,497,931
Kansas City, Mex. & Orient ..... May	272	208,657	7,123	223,229	37,859	48,767	4,556	75,082	7,600	173,864	77.90	49,365	39,357	19,510	—5,141
5 mos.	272	1,101,015	34,265	1,171,830	193,058	261,335	28,575	412,297	141,917	1,037,180	88.50	134,650	86,043	—28,952	—83,230
Kans. City, Mex. & Orient of Tex. May	465	239,354	14,705	262,592	51,978	60,088	6,562	87,909	7,424	213,873	81.40	48,719	41,751	18,905	7,245
5 mos.	465	1,273,753	65,339	1,384,853	240,275	269,869	32,218	456,190	30,408	1,028,766	74.30	356,087	321,227	219,561	—24,757
Kansas City Southern ..... May	773	1,252,270	131,592	1,544,154	227,942	313,791	45,376	492,417	77,084	1,156,698	74.90	387,456	291,240	255,056	162,226
5 mos.	773	5,927,888	618,069	7,226,530	944,566	1,387,649	220,357	2,386,548	375,633	5,300,136	73.30	1,926,394	1,451,086	1,321,719	1,161,179
Tex. & Ft. Smith ..... May	81	232,441	11,048	282,968	31,993	14,876	6,308	68,617	8,904	133,499	47.10	149,469	133,394	116,300	49,197
5 mos.	81	1,046,638	54,260	1,200,139	134,975	89,317	27,254	349,476	46,406	656,535	54.70	543,604	464,165	342,364	400,256
Kansas Oklahoma & Gulf ..... May	314	142,107	6,628	152,666	49,869	30,821	7,957	66,869	10,513	166,104	108.80	—13,438	—18,386	—24,412	—24,579
5 mos.	314	759,348	36,867	821,848	274,851	156,090	41,852	350,724	42,268	865,389	105.30	—43,541	—84,706	—128,593	—28,689
Lake Superior & Ishpeming ..... May	161	198,273	2,166	229,274	44,750	23,811	389	52,355	4,574	125,835	54.90	103,439	89,291	86,018	61,206
5 mos.	161	484,395	22,454	557,735	150,156	129,494	2,402	201,317	23,873	507,199	90.90	50,536	—9,063	—29,084	—62,416
Lake Terminal ..... May	13	.....	.....	111,751	18,959	20,228	.....	60,658	1,635	101,480	90.80	10,271	4,372	9,436	—7,283
5 mos.	13	.....	.....	461,997	71,189	91,021	.....	273,714	8,530	444,454	96.20	17,543	—12,957	—4,613	—70,113
Lehigh & Hudson River ..... May	96	276,887	2,006	291,015	29,166	44,902	2,244	100,723	8,601	185,636	63.80	105,379	88,520	61,034	49,276
5 mos.	96	1,232,160	13,340	1,309,620	137,276	231,697	10,293	498,787	49,098	927,151	70.80	382,469	313,681	187,789	199,570
Lehigh & New England ..... May	219	530,158	1,216	539,877	62,893	124,556	6,278	146,611	17,836	358,080	66.30	181,797	158,279	154,541	126,748
5 mos.	219	2,111,926	8,515	2,157,524	239,690	551,411	28,245	682,178	94,191	1,594,912	73.90	562,612	477,188	504,764	329,917
Lehigh Valley ..... May	1,374	5,709,667	624,868	6,819,071	671,747	1,349,295	130,019	2,479,255	162,888	4,820,432	70.70	1,998,639	1,592,805	1,541,540	901,982
5 mos.	1,374	26,093,407	2,953,743	31,517,398	3,393,785	6,499,606	587,522	12,682,041	715,589	24,007,711	76.20	7,509,687	5,845,807	5,258,011	4,100,357
Louisiana & Arkansas ..... May	302	320,939	20,234	349,153	41,198	66,944	9,819	95,702	14,601	227,705	65.20	121,448	94,993	79,319	64,185
5 mos.	302	1,494,891	117,922	1,652,875	269,153	321,921	51,360	470,849	62,773	1,172,279	70.90	480,596	345,040	284,161	253,296
Louisiana Ry. & Nav. Co. ..... May	337	284,884	17,470	317,048	53,663	41,908	9,318	123,091	9,946	234,492	73.90	82,556	62,434	33,059	—27,016
5 mos.	337	1,293,515	86,374	1,481,519	329,079	219,991	52,200	644,471	51,594	1,290,119	87.10	191,400	90,726	—56,496	—103,248
Louisiana Ry. & Nav. of Tex. ..... May	206	90,037	7,273	102,747	16,332	16,191	3,141	44,348	5,660	85,672	83.40	17,075	13,075	—7,716	—1,925
5 mos.	206	454,866	38,444	524,806	100,593	85,451	15,868	251,674	27,671	481,257	91.70	43,549	23,727	—59,579	—79,622
Louisville & Nashville ..... May	5,044	8,504,736	1,841,679	11,106,951	1,719,588	2,582,159	271,799	3,949,902	274,690	8,851,735	79.70	2,255,216	1,842,443	1,829,512	1,369,469
5 mos.	5,044	43,503,714	8,931,685	55,905,543	8,120,578	13,290,231	1,224,216	20,285,266	1,317,324	44,449,885	79.50	11,455,658	9,001,752	8,963,798	6,934,523
Louisville, Henderson & St. Louis. May	199	195,414	60,176	274,228	62,044	39,667	7,811	96,645	9,999	216,166	78.80	58,062	43,162	44,321	26,242
5 mos.	199	1,180,507	267,544	1,541,743	255,142	202,580	35,806	500,658	48,303	1,042,489	67.60	499,254	407,791	340,786	210,174
Maine Central ..... May	1,207	1,259,986	265,828	1,687,417	281,568	324,220	14,518	646,220	52,316	1,318,415	78.10	369,002	268,587	269,986	198,252
5 mos.	1,207	6,143,466	1,523,798	8,400,587	1,291,587	1,655,327	63,914	3,365,652	249,096	6,624,377	78.90	1,776,210	1,274,101	1,219,344	938,195
Midland Valley ..... May	364	303,360	40,880	357,953	75,968	48,738	5,798	102,226	18,238	249,277	69.60	108,676	91,350	67,990	72,961
5 mos.	364	1,513,335	208,137	1,795,494	284,357	237,754	30,472	537,473	94,771	1,177,672	65.60	617,822	533,215	438,799	520,863
Minneapolis & St. Louis ..... May	1,638	840,598	83,172	986,091	340,085	268,107	30,808	477,691	45,056	1,161,805	117.80	—175,714	—238,365	—263,471	—446,313
5 mos.	1,638	4,971,281	520,180	5,824,605	1,154,831	1,348,946	153,184	2,797,654	244,431	5,692,975	97.70	131,630	—195,664	—443,132	—697,474
Minn., St. Paul & S. S. Marie ..... May	4,400	2,885,007	390,975	3,573,678	627,230	702,408	72,351	1,421,694	112,189	2,950,947	82.60	622,731	373,949	311,919	140,938
5 mos.	4,403	13,895,517	2,257,201	17,504,459	2,453,580	3,523,831	340,191	7,379,275	551,116	14,310,243	81.80	3,194,216	1,987,027	1,461,816	929,845
Duluth Shore Shore & Atlantic. May	590	419,029	64,604	535,933	127,121	74,045	8,021	206,823	10,970	432,302	80.70	103,631	75,631	57,700	46,174
5 mos.	591	1,745,392	407,551	2,329,608	343,938	424,337	35,233	989,926	57,437	1,876,514	80.60	453,094	307,085	214,166	155,857
Spokane International ..... May	165	79,898	10,274	96,553	15,504	9,743	3,347	36,179	6,421	71,951	74.50	24,602	19,395	13,346	13,723
5 mos.	165	369,679	60,119	457,634	61,776	40,011	15,967	166,760	32,814	322,308	70.40	135,326	109,249	76,949	82,325
Mississippi Central ..... May	164	123,992	10,698	139,328	18,347	21,302	7,130	33,547	9,744	90,070	64.60	49,258	34,745	38,631	43,564
5 mos.	181	562,526	57,302	644,787	85,423	107,488	34,880	182,717	42,372	452,880	70.20	191,907	140,133	154,595	202,476

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or less).	Net after rents.	Net after rents, 1924.
Missouri & North Arkansas	May	364	$88,725	$14,327	$112,002	$28,712	$20,072	$4,919	$45,301	$7,494	$106,498	95.90	$4,504	$2,113	—$6,174	—$2,955
	5 mos.	364	507,953	74,825	624,484	136,212	108,912	25,791	250,988	35,827	557,730	89.30	66,754	57,737	11,987	—186
Missouri, Kansas, Texas	May	1,799	2,060,636	413,192	2,662,780	273,945	600,705	52,124	717,348	94,315	1,746,657	65.60	916,123	779,862	768,624	803,994
	5 mos.	1,799	10,634,942	1,960,671	13,648,633	1,334,248	2,950,771	263,392	3,768,707	461,701	8,821,708	64.60	4,826,925	3,884,956	3,907,560	3,515,190
Mo., Kansas, Texas of Texas	May	1,389	1,097,768	384,882	1,618,731	281,479	188,140	42,719	662,300	67,264	1,248,997	77.20	369,734	316,261	145,384	56,311
	5 mos.	1,389	6,424,291	1,776,305	8,951,922	1,274,520	1,382,412	209,256	3,572,468	340,867	6,807,712	76.00	2,144,210	1,854,844	863,548	537,671
Missouri Pacific	May	7,337	8,023,181	1,297,774	10,214,896	1,617,190	2,097,676	253,416	3,790,641	327,148	8,154,244	80.60	1,960,652	1,537,999	1,153,141	1,099,758
	5 mos.	7,337	41,412,517	6,557,121	52,011,028	7,393,057	10,861,617	1,221,330	20,267,678	1,624,839	41,678,549	80.10	10,332,479	8,238,106	5,903,133	5,310,136
Gulf Coast Lines	May	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	5 mos.	....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
International Great Northern	May	1,159	1,018,642	191,894	1,323,494	280,100	242,977	36,361	554,054	60,076	1,136,545	85.87	186,949	180,129	129,495	110,631
	5 mos.	1,159	5,377,607	876,685	6,939,276	1,348,735	1,207,598	185,838	2,742,526	273,092	5,667,190	81.67	1,272,086	1,087,823	660,374	525,967
Texas & Pacific	May	1,952	1,750,915	552,052	2,511,006	394,469	544,782	63,204	957,826	100,594	2,057,675	81.90	453,331	301,035	242,696	17,557
	5 mos.	1,952	9,750,644	2,570,689	13,351,172	2,018,811	2,741,714	312,099	5,082,919	465,419	10,617,485	79.50	2,733,687	2,007,646	1,631,863	1,508,919
Mobile & Ohio	May	1,161	1,283,584	125,357	1,494,958	241,714	272,356	49,934	547,475	43,752	1,155,382	77.30	339,576	247,087	209,012	385,614
	5 mos.	1,161	6,663,917	659,098	7,777,511	1,118,685	1,392,842	246,309	2,786,237	223,461	5,768,555	74.20	2,008,956	1,560,142	1,288,482	1,648,984
Monongahela	May	129	377,257	22,680	403,974	62,500	65,000	1,026	103,853	9,288	241,557	59.80	162,417	146,415	94,770	27,318
	5 mos.	129	1,989,037	126,468	2,136,142	312,500	325,000	6,236	589,044	49,121	1,280,662	60.00	855,480	775,129	487,871	274,574
Monongahela Connecting	May	7	.....	.....	178,213	21,753	37,053	374	79,566	3,279	142,025	79.70	36,188	31,765	34,433	—11,876
	5 mos.	7	.....	.....	997,890	112,093	216,038	1,873	507,834	17,132	854,976	85.70	142,914	119,073	119,646	4,244
Montour	May	57	72,612	323	74,291	17,659	31,506	520	16,739	7,141	73,965	99.60	326	—4,451	27,211	36,095
	5 mos.	57	487,926	3,867	496,962	97,829	219,267	4,927	135,913	36,577	494,513	99.50	2,449	—22,500	134,901	139,856
Nashville, Chatt. & St. Louis	May	1,259	1,333,474	380,165	1,855,504	365,134	440,594	81,448	698,529	64,956	1,644,397	88.60	211,107	150,973	96,602	129,012
	5 mos.	1,259	7,095,478	1,928,481	9,789,958	1,533,476	2,209,461	391,171	3,579,447	346,720	8,099,973	82.70	1,689,985	1,388,925	1,275,916	1,153,748
Nevada Northern	May	165	76,252	10,690	94,118	15,358	5,278	869	15,565	6,393	43,622	46.30	50,496	40,020	40,348	35,512
	5 mos.	165	349,986	45,425	426,140	84,735	38,659	4,749	87,498	27,110	243,080	57.00	183,060	130,666	131,839	178,123
Newburgh & South Shore	May	7	.....	.....	161,142	34,879	38,805	.....	61,482	3,818	138,984	86.20	22,158	9,353	13,642	—9,453
	5 mos.	7	.....	.....	865,337	84,905	196,407	.....	346,991	23,331	651,634	75.30	213,703	148,383	171,387	55,765
New Orleans Great Northern	May	274	191,239	26,585	226,585	39,562	42,243	5,982	75,182	10,692	173,679	76.70	52,906	32,879	23,328	41,257
	5 mos.	274	1,019,177	123,379	1,186,062	177,303	201,267	32,392	379,032	53,600	843,687	71.10	342,375	242,888	192,924	233,361
New York Central	May	6,922	19,095,328	7,810,059	31,186,196	4,057,920	6,425,859	377,491	10,634,231	876,038	22,798,584	73.10	8,387,612	6,133,171	5,841,564	5,595,386
	5 mos.	6,922	94,124,074	36,304,400	149,717,444	18,230,586	32,364,280	1,807,970	55,853,662	4,493,826	114,673,070	76.60	35,044,374	24,574,299	23,408,123	24,848,932
Cincinnati Northern	May	244	340,463	7,547	357,513	49,872	63,003	6,025	110,989	10,139	239,142	66.90	118,371	96,016	62,855	28,402
	5 mos.	244	1,694,185	40,881	1,770,880	209,677	322,209	30,212	594,825	48,700	1,204,726	68.00	566,154	451,947	328,160	273,954
Cleve., Cin., Chicago & St. Louis	May	2,398	5,333,768	1,317,261	7,516,876	952,668	1,477,403	127,585	2,575,349	192,624	5,390,277	73.70	1,926,599	1,482,785	1,328,321	1,057,188
	5 mos.	2,398	26,776,946	6,189,966	36,002,486	3,984,679	7,417,593	615,243	13,366,794	1,000,880	26,673,124	74.10	9,329,362	7,134,243	6,600,756	5,248,283
Indiana Harbor Belt	May	116	.....	.....	857,242	104,373	103,851	4,433	351,496	23,119	586,832	68.50	270,410	225,878	181,750	60,191
	5 mos.	116	.....	.....	4,457,287	459,564	608,186	25,638	1,948,435	114,472	3,155,396	70.80	1,301,891	1,120,692	615,817	386,085
Michigan Central	May	1,862	5,017,344	1,591,869	7,280,140	961,967	1,495,856	103,867	2,366,672	152,449	5,157,296	70.80	2,122,844	1,673,830	1,706,601	1,254,444
	5 mos.	1,862	24,576,433	7,530,151	35,658,828	4,038,180	7,456,144	524,185	12,271,642	785,352	25,452,344	71.40	10,206,484	8,044,943	8,233,631	7,856,206
Pittsburgh & Lake Erie	May	231	2,133,854	239,541	2,469,020	330,893	844,778	25,558	810,241	71,175	2,082,373	84.30	386,647	218,147	524,315	509,862
	5 mos.	231	11,993,506	1,199,477	13,677,320	1,709,357	4,207,445	118,937	4,474,897	364,705	10,874,719	79.50	2,802,601	1,920,423	3,738,587	3,906,635
New York, Chicago & St. Louis	May	1,695	4,249,782	166,424	4,584,825	635,145	862,545	119,922	1,545,083	158,526	3,322,077	72.50	1,262,748	1,015,891	863,056	610,221
	5 mos.	1,695	20,827,245	704,987	22,288,561	2,693,158	4,318,038	599,176	7,979,931	806,615	16,325,629	73.20	5,962,932	4,722,895	4,235,558	3,454,015
N. Y., New Haven & Hartford	May	1,946	5,633,404	3,890,571	10,659,820	1,770,185	2,107,059	72,542	3,744,266	280,299	8,129,590	76.30	2,530,230	2,112,259	1,590,542	1,427,969
	5 mos.	1,955	26,715,009	19,497,430	52,032,255	6,069,222	11,126,858	345,231	19,380,257	1,434,300	39,128,025	75.20	12,904,230	10,898,776	8,459,855	7,417,503
Central New England	May	292	613,858	8,409	641,706	151,439	110,759	5,681	193,610	14,172	475,661	74.10	166,045	141,044	97,680	161,664
	5 mos.	292	3,024,314	50,028	3,177,818	490,341	554,820	27,971	1,033,214	72,710	2,179,039	68.60	998,779	872,220	673,552	691,130
New York Connecting	May	20	197,222	.....	222,402	17,976	13,807	.....	48,499	1,188	81,470	36.60	140,932	99,682	89,110	83,443
	5 mos.	20	996,186	.....	1,132,521	55,064	53,384	.....	250,549	6,402	365,399	32.30	767,122	564,372	514,351	456,491
New York, Ontario & Western	May	569	797,179	162,345	1,140,727	150,819	217,594	16,487	457,646	34,379	881,067	77.20	259,660	220,572	174,641	102,891
	5 mos.	569	3,355,411	532,574	4,702,940	644,106	1,050,270	82,902	2,253,795	179,489	4,229,044	89.90	473,896	250,590	61,634	114,717
Norfolk & Western	May	2,240	6,784,243	638,884	7,729,035	1,128,426	1,851,261	101,980	2,216,172	173,227	5,432,400	70.30	2,296,635	1,696,153	1,792,897	937,642
	5 mos.	2,240	34,106,272	3,208,039	38,884,205	5,361,543	8,905,579	487,795	11,504,369	872,943	27,114,238	69.70	11,769,967	8,768,478	9,626,653	6,233,257
Norfolk Southern	May	931	589,332	75,234	705,582	101,648	120,162	24,789	296,376	29,516	572,479	81.10	133,103	86,842	54,619	102,954
	5 mos.	931	3,131,671	396,011	3,746,764	498,019	527,433	116,711	1,511,507	141,947	2,797,129	74.70	949,635	718,053	526,993	623,380
Northern Pacific	May	6,694	5,341,635	981,466	7,002,703	1,551,281	1,368,702	209,562	2,481,671	245,158	5,931,922	84.70	1,070,781	397,603	685,899	171,136
	5 mos.	6,694	26,527,193	4,665,370	34,301,576	5,225,655	7,368,168	862,469	13,473,201	1,256,825	28,589,643	83.30	5,711,933	2,367,223	4,059,456	4,500,882
Northwestern Pacific	May	496	308,659	191,113	555,788	94,506	83,658	8,803	226,703	17,694	430,241	77.40	125,547	79,501	69,038	114,585
	5 mos.	486	1,403,449	778,165	2,427,933	470,200	418,635	30,805	1,090,799	88,164	2,097,136	86.40	330,797	99,609	54,024	127,489

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or less).	Net after rents.	Net after rents, 1924.
Pennsylvania	May	10,507	$37,721,406	$11,836,885	$54,676,413	$6,636,496	$12,961,474	$696,665	$20,243,390	$1,587,756	$42,766,566	78.20	$11,909,847	$8,822,825	$7,647,618	$6,017,605
	5 mos.	10,507	180,831,730	57,974,711	263,031,707	32,680,099	67,986,338	3,277,603	101,635,895	7,596,554	216,726,534	82.40	46,305,173	34,906,445	28,983,234	31,932,563
Baltimore, Chesapeake & Atlantic	May	130	84,581	30,161	120,873	17,815	54,209	1,956	77,284	3,700	154,964	128.20	—34,091	—39,155	—39,304	—20,501
	5 mos.	130	336,535	124,747	492,450	61,479	194,689	8,359	372,898	17,332	654,757	133.00	—162,307	—168,751	—175,999	—109,235
Long Island	May	397	945,574	2,036,379	3,185,343	428,946	522,386	21,267	1,292,831	78,776	2,352,658	73.90	832,685	656,096	479,787	280,035
	5 mos.	397	4,146,203	8,294,350	13,460,241	1,928,532	2,503,437	104,009	6,313,160	367,621	11,259,208	83.60	2,201,033	1,786,923	1,356,088	1,008,413
West Jersey & Seashore	May	361	425,031	577,529	1,067,237	170,050	160,317	18,524	453,275	29,897	832,665	78.00	234,572	151,495	128,185	—14,215
	5 mos.	361	1,922,346	2,480,486	4,680,662	820,410	771,464	69,723	2,320,130	127,945	4,112,186	87.90	568,476	449,981	329,580	15,457
Peoria & Pekin Union	May	19	20,475	3,059	132,818	28,329	13,828	602	56,796	7,536	107,091	80.60	25,727	9,727	33,371	32,750
	5 mos.	19	135,459	17,884	892,656	91,933	93,689	4,031	369,183	40,432	599,268	74.70	203,388	123,388	227,114	260,023
Pere Marquette	May	2,263	2,825,843	311,946	3,367,384	568,158	723,814	54,172	1,171,667	97,827	2,620,257	77.80	747,127	587,606	480,338	321,049
	5 mos.	2,263	13,189,661	1,611,058	15,916,428	1,804,535	3,690,938	260,990	6,032,200	495,995	12,303,497	77.30	3,612,931	2,885,832	2,583,529	2,192,510
Pittsburgh & Shawmut	May	102	94,742	3,104	100,009	14,348	32,178	1,346	26,981	7,175	82,028	82.00	17,981	17,839	21,444	4,069
	5 mos.	102	463,116	26,928	500,795	70,029	167,294	6,858	152,297	33,603	430,081	85.90	70,714	58,821	89,795	19,797
Pittsburgh & West Virginia	May	92	376,005	7,520	418,052	59,614	86,691	5,815	72,541	14,777	251,402	60.10	166,650	126,137	186,235	92,178
	5 mos.	92	1,670,227	38,282	1,881,080	176,154	468,328	29,614	371,530	92,666	1,195,834	63.50	685,246	480,716	760,246	553,559
Pittsburgh, Shawmut & Northern	May	210	145,797	2,761	152,028	30,270	33,310	1,796	52,596	11,082	129,054	84.90	22,974	20,275	11,389	—2,059
	5 mos.	210	697,116	20,221	732,871	115,270	175,689	8,508	270,333	33,175	602,975	82.30	129,896	116,354	95,154	—47,735
Quincy, Omaha & Kansas City	May	250	54,341	15,200	76,505	37,715	7,575	788	37,986	2,831	86,353	112.90	—9,848	—14,483	—16,895	—24,287
	5 mos.	250	226,389	86,031	349,353	123,889	73,119	4,033	219,041	13,839	431,980	123.70	—82,627	—105,792	—119,692	—65,434
Reading Company	May	1,139	6,567,503	834,113	7,768,277	1,019,634	1,763,237	73,188	2,803,648	171,575	5,817,374	74.80	1,950,903	1,583,373	1,702,374	1,655,117
	5 mos.	1,139	32,249,883	4,204,467	38,254,560	4,683,291	8,892,095	347,168	14,357,553	882,981	29,126,270	76.10	9,128,290	7,289,626	7,806,729	7,157,714
Atlantic City	May	169	124,488	214,120	355,397	72,765	33,138	9,206	192,674	4,383	312,229	87.90	43,168	20,472	—7,802	—41,765
	5 mos.	169	630,448	757,580	1,462,876	481,089	209,011	29,585	922,063	20,877	1,663,093	113.70	—200,217	—313,697	—439,147	—482,336
Perkiomen	May	41	103,901	5,931	113,158	7,265	5,469	106	45,811	770	59,464	52.50	53,694	48,260	42,464	29,243
	5 mos.	41	463,101	29,223	510,852	44,818	26,344	537	230,942	3,919	306,782	60.10	204,070	178,056	152,911	148,603
Port Reading	May	19	130,639	.....	197,319	28,635	13,712	229	60,964	1,336	104,877	53.20	92,442	77,080	11,263	2,171
	5 mos.	19	747,678	.....	976,205	102,583	36,102	1,145	347,543	11,177	498,539	51.10	477,666	396,630	43,869	—22,176
Richmond, Fred'ksburg & Potomac	May	117	634,579	314,582	1,130,508	110,487	160,856	9,073	349,908	33,479	691,080	61.10	439,428	372,045	299,394	216,603
	5 mos.	117	2,617,573	1,987,298	5,549,777	493,236	809,267	44,822	1,749,238	168,323	3,423,515	61.70	2,126,262	1,798,013	1,439,020	1,173,168
Rutland	May	413	333,477	76,517	523,118	103,527	98,453	10,360	213,390	12,915	440,295	84.20	82,823	58,416	63,297	72,587
	5 mos.	413	1,533,347	471,475	2,512,273	455,466	559,694	48,071	1,124,786	69,302	2,264,428	90.10	247,845	135,915	197,279	337,843
St. Louis-San Francisco	May	4,902	5,199,791	1,353,589	7,107,524	891,954	1,403,094	113,637	2,423,817	231,640	5,042,712	70.90	2,064,812	1,732,339	1,724,341	1,332,403
	5 mos.	4,902	25,760,233	6,473,687	34,698,913	3,944,048	6,871,181	514,669	12,286,893	1,155,228	24,677,656	71.10	10,021,257	8,243,455	8,152,565	7,402,736
Ft. Worth & Rio Grande	May	233	63,856	13,885	91,006	23,863	20,709	3,164	53,072	5,639	106,423	116.90	—15,417	—19,450	—28,007	—6,538
	5 mos.	233	430,590	90,643	569,784	112,234	115,196	15,896	283,977	25,095	551,682	96.80	18,102	—2,138	—49,332	—14,436
St. Louis, San Francisco & Tex.	May	137	122,604	11,436	140,009	30,599	27,805	4,728	59,635	7,157	129,915	92.70	10,094	7,758	—16,944	429
	5 mos.	137	784,752	62,977	876,138	124,799	143,882	24,999	315,125	36,867	645,654	73.70	230,484	218,326	92,427	11,594
St. Louis Southwestern	May	940	1,165,852	135,208	1,376,290	165,373	250,748	51,481	359,069	62,636	903,986	65.70	472,304	419,536	352,706	241,210
	5 mos.	946	6,360,287	624,960	7,396,243	1,055,305	1,588,196	254,641	1,862,461	304,547	5,144,104	69.60	2,252,139	1,974,203	1,568,224	1,515,514
St. Louis Southwestern of Texas	May	807	398,863	85,041	528,158	155,053	149,231	23,077	236,507	33,334	601,954	114.00	—73,796	—100,559	—54,439	—14,121
	5 mos.	807	2,451,904	348,380	3,036,344	744,724	887,317	114,470	1,254,447	159,745	3,175,613	104.60	—139,269	—274,466	—42,259	—75,841
San Antonio & Aransas Pass	May	Included in Galveston, Harrisburg & San Antonio.														
	5 mos.															
San Antonio, Uvalde & Gulf	May	318	86,185	15,442	113,009	20,269	12,204	4,509	46,248	6,297	89,488	79.20	23,521	19,896	11,092	24,468
	5 mos.	318	541,722	81,950	681,662	110,373	76,261	24,123	269,388	31,388	511,494	75.00	170,168	151,438	92,809	42,194
Seaboard Air Line	May	3,778	3,616,222	791,990	4,927,459	736,702	796,086	175,606	1,853,598	174,919	3,796,980	77.10	1,130,479	899,489	749,597	702,056
	5 mos.	3,756	17,983,726	4,910,145	25,552,793	3,289,496	4,195,188	849,170	9,755,034	864,270	19,349,597	75.70	6,203,196	5,066,402	4,098,591	4,120,351
Southern Ry	May	6,868	8,162,918	2,381,152	11,469,205	1,873,854	2,111,787	237,340	4,004,931	312,847	8,627,537	75.20	2,841,668	2,208,124	2,121,481	2,266,355
	5 mos.	6,868	42,753,718	11,897,196	59,286,263	8,582,058	10,575,226	1,178,782	20,730,341	1,570,900	43,072,874	72.70	16,213,389	12,673,188	12,072,154	10,698,387
Alabama Great Southern	May	318	616,269	158,003	825,233	124,568	153,262	20,872	250,979	24,005	580,110	70.30	245,123	191,247	210,924	184,295
	5 mos.	318	3,134,260	747,082	4,126,964	577,576	809,295	101,886	1,298,549	120,679	2,940,946	71.30	1,186,018	947,361	1,039,078	889,478
Cin., New Orleans & Tex. Pacific	May	338	1,514,291	305,431	1,924,240	325,348	314,877	40,099	537,432	49,225	1,285,813	66.80	638,427	529,443	504,844	428,680
	5 mos.	338	7,090,128	1,753,717	9,358,717	1,321,441	1,687,988	200,074	2,687,338	250,776	6,238,438	66.70	3,120,279	2,638,940	2,570,319	2,185,044
Georgia Southern & Florida	May	401	329,837	133,433	498,342	63,541	69,330	10,976	171,375	10,370	330,480	66.30	167,862	143,529	136,364	42,639
	5 mos.	401	1,510,737	622,363	2,387,079	323,822	306,456	50,739	851,546	51,713	1,615,045	67.70	772,034	649,794	451,604	184,469
New Orleans & Northeastern	May	207	333,539	77,264	441,960	54,261	64,805	10,823	131,441	14,823	279,851	63.30	162,109	109,574	92,290	82,204
	5 mos.	207	1,839,749	382,529	2,384,723	298,554	357,026	54,443	697,818	74,358	1,501,279	63.00	883,444	637,010	550,326	483,539
Northern Alabama	May	110	105,640	9,297	117,950	20,257	4,118	2,018	35,782	4,009	66,112	56.10	51,838	43,698	18,214	5,875
	5 mos.	110	566,243	50,447	631,025	109,391	22,933	10,483	193,401	16,370	352,506	55.90	278,519	246,879	106,395	114,074

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF MAY AND FIVE MONTHS OF CALENDAR YEAR 1925—CONTINUED

Name of road		Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of—Way and structures.	Maintenance of—Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or less).	Net after rents.	Net after rents, 1924.
Southern Pacific	May	8,722	$11,063,701	$3,392,504	$16,104,727	$2,492,776	$2,890,336	$288,937	$6,124,519	$577,993	$12,622,334	78.40	$3,482,393	$2,549,131	$2,302,276	$2,840,834
	5 mos.	8,722	53,167,684	16,722,911	77,456,417	12,140,801	14,583,992	1,533,865	29,167,895	2,749,875	61,239,263	79.10	16,217,154	9,786,874	9,461,986	12,976,646
Atlantic Steamship Lines	May	...	803,587	51,343	1,009,895	16,126	280,660	16,168	605,608	32,764	951,326	94.20	58,569	44,028	43,897	—24,776
	5 mos.	...	3,804,195	200,129	4,684,048	74,515	1,000,941	98,861	3,588,425	148,006	4,910,748	104.80	—226,700	—299,856	—301,230	76,743
Galveston, Harrisb'g & S. Antonio	May	2,108	1,658,430	407,731	2,211,524	443,522	506,629	55,402	841,996	121,778	1,993,312	90.10	218,212	128,513	74,932	381,906
	5 mos.	1,525	7,207,392	1,936,998	9,828,284	1,813,588	2,089,400	239,834	3,476,165	481,692	8,202,988	83.50	1,625,296	1,279,261	989,521	1,121,641
Houston & Texas Central	May	929	738,219	248,106	1,069,667	282,567	237,553	29,379	434,742	47,287	1,031,794	96.50	37,873	11,497	—39,161	—2,496
	5 mos.	929	4,583,608	1,249,669	6,248,898	1,363,153	1,216,167	136,092	2,127,689	232,981	5,079,379	81.30	1,169,519	831,362	573,452	100,219
Houston East & West Texas	May	191	226,543	37,452	276,705	88,022	55,298	3,957	94,877	9,380	251,053	91.10	24,752	14,739	—7,597	—33,934
	5 mos.	191	1,038,681	177,451	1,280,017	322,142	258,139	17,992	450,624	46,679	1,093,961	85.50	186,056	136,803	53,837	—115,315
Louisiana Western	May	207	270,057	75,770	368,519	61,446	75,182	13,587	112,428	18,776	285,289	77.40	83,230	64,264	58,855	31,184
	5 mos.	207	1,179,920	381,125	1,682,792	333,070	350,288	61,458	528,712	95,219	1,388,267	82.50	294,525	182,523	142,040	253,936
Morgan's L. & T. R. R. & S. S. Co.	May	400	533,204	119,662	710,623	104,259	152,334	22,018	288,525	36,069	608,083	85.60	102,540	51,818	26,378	—93,031
	5 mos.	400	2,552,732	606,382	3,411,906	634,443	848,827	97,919	1,491,433	191,706	3,287,732	96.40	124,174	—130,964	—311,739	—281,590
Texas & New Orleans	May	544	720,121	146,884	910,220	182,528	215,668	13,283	340,032	33,695	789,044	86.70	121,176	89,122	60,345	—94,090
	5 mos.	537	3,430,065	745,049	4,428,625	800,267	1,070,944	70,838	1,590,639	162,507	3,712,121	83 80	716,504	555,068	430,562	—252,996
Spokane, Portland & Seattle	May	554	436,504	110,509	616,325	86,296	108,222	11,105	191,961	22,911	428,594	69.50	187,731	111,367	77,382	145,282
	5 mos.	554	2,131,282	500,668	2,963,153	356,012	539,321	49,806	943,778	105,915	2,032,820	68.60	930,333	556,109	404,544	769,693
Tennessee Central	May	296	203,136	36,826	255,602	40,876	33,866	7,547	87,931	11,511	181,656	71.10	73,946	65,068	46,356	51,729
	5 mos.	296	973,230	177,717	1,228,124	218,439	212,420	36,555	462,344	53,904	983,318	80.10	244,806	218,999	120,067	201,963
Terminal R. R. Ass'n of St. Louis	May	37	.....	.....	412,242	69,898	37,701	1,074	143,104	8,994	264,275	64.10	147,967	83,029	181,323	159,253
	5 mos.	37	.....	.....	2,104,048	299,964	210,261	4,671	793,521	44,275	1,369,336	65.10	734,712	431,579	931,814	696,997
East St. Louis Connecting	May	1	.....	.....	176,984	24,684	5,905	340	61,825	2,467	95,221	53.80	81,763	75,370	54,883	37,097
	5 mos.	1	.....	.....	959,953	96,642	55,584	1,475	364,761	12,853	531,315	55.30	428,638	399,854	293,384	259,408
St. L. Merchants' Bridge Term.	May	9	.....	.....	382,572	82,381	19,086	1,017	174,092	11,750	288,326	75.40	94,246	64,712	68,765	41,267
	5 mos.	9	.....	.....	1,991,983	357,778	132,989	4,413	924,696	39,413	1,459,289	73.30	532,694	395,852	393,264	287,079
St. Louis Transfer	May	6	.....	.....	58,614	9,275	2,909	183	30,907	1,207	44,481	75.90	14,133	13,749	8,359	4,590
	5 mos.	6	.....	.....	336,362	46,777	26,294	795	191,344	6,004	271,214	80.60	65,148	63,120	33,334	10,215
Toledo, Peoria & Western	May	247	95,317	20,877	126,369	31,385	37,261	2,445	66,465	5,918	144,474	114.30	—18,105	—24,113	—29,020	2,675
	5 mos.	247	467,984	128,570	647,293	124,168	199,214	11,293	351,559	34,750	720,906	111.40	—73,613	—103,660	—139,927	5,161
Trinity & Brazos Valley	May	368	107,581	9,997	123,217	68,672	51,487	3,807	75,857	11,668	211,211	171.40	—87,994	—95,671	—120,076	—97,774
	5 mos.	368	1,173,452	56,565	1,271,755	278,951	251,890	18,744	558,317	62,033	1,167,268	91.80	104,487	65,316	—95,873	—364,357
Ulster & Delaware	May	128	75,115	14,337	126,334	23,606	19,900	1,825	56,659	5,916	167,906	85.40	18,428	12,926	6,897	18,061
	5 mos.	128	250,488	53,517	466,168	80,348	95,312	9,605	250,202	31,436	466,903	100.20	—735	—28,237	—43,664	—19,716
Union Railroad of Penna	May	45	.....	.....	1,085,392	99,372	183,688	161	426,337	9,814	719,372	66.30	366,020	325,020	400,775	51,873
	5 mos.	45	.....	.....	4,662,094	454,857	1,287,699	888	2,163,061	48,857	3,955,362	84.80	706,732	621,732	855,593	362,747
Union Pacific	May	3,687	5,544,086	1,409,775	7,706,624	1,107,185	1,556,161	217,041	2,069,966	279,008	5,405,114	70.10	2,301,510	1,651,013	1,586,138	1,063,228
	5 mos.	3,687	26,870,745	6,215,629	36,631,771	3,958,697	8,257,852	808,687	10,787,886	1,410,945	25,963,878	70.90	10,667,893	7,287,987	7,258,310	8,076,127
Oregon Short Line	May	2,444	1,805,515	353,189	2,346,205	476,570	471,669	61,033	756,255	107,792	1,930,399	82.30	415,806	170,479	126,074	53,197
	5 mos.	2,423	9,443,025	1,736,743	12,094,021	1,985,114	2,431,931	253,853	4,010,214	551,625	9,494,508	78.50	2,599,513	1,372,398	1,221,558	1,587,418
Oregon, Wash. R. R. & Nav.	May	2,237	1,487,383	348,641	2,017,030	427,673	340,122	77,559	815,881	112,322	1,800,762	89.30	216,268	46,254	—38,636	67,963
	5 mos.	2,237	7,469,795	1,675,504	10,065,717	1,909,669	1,781,184	330,072	4,141,214	566,355	8,867,484	88.10	1,198,233	347,972	—36,447	1,098,594
Los Angeles & Salt Lake	May	1,207	1,318,620	460,258	1,998,742	332,450	362,841	75,768	667,753	64,690	1,577,859	78.90	420,883	282,963	199,847	122,875
	5 mos.	1,207	6,728,928	1,813,034	9,368,486	1,584,615	1,937,946	341,249	3,227,821	325,580	7,729,975	82.50	1,638,511	943,782	586,493	1,029,447
St. Joseph & Grand Island	May	258	211,505	18,631	247,475	58,854	39,271	2,874	57,847	12,208	201,054	81.20	46,421	29,852	18,865	—2,888
	5 mos.	258	1,127,097	97,347	1,302,070	228,286	212,135	14,101	482,146	60,338	997,509	76.60	304,561	221,717	162,662	114,004
Utah	May	102	93,633	152	94,659	11,723	38,024	347	21,522	6,024	77,640	82.00	17,019	10,883	8,020	7,949
	5 mos.	102	659,905	1,805	665,748	65,257	202,441	1,837	157,267	29,528	456,330	68.50	209,418	174,534	139,048	54,380
Virginian	May	545	1,376,209	53,697	1,537,542	268,465	351,030	12,879	363,047	31,594	1,016,645	66.10	520,897	406,597	417,437	363,025
	5 mos.	545	6,814,506	297,898	7,666,904	1,148,412	1,723,624	63,430	1,865,855	166,131	4,937,326	64.40	2,729,578	2,133,630	2,220,947	1,922,046
Wabash	May	2,524	4,547,820	750,485	5,697,632	848,976	1,034,750	148,046	2,072,400	169,245	4,303,069	75.50	1,394,563	1,161,685	894,038	439,966
	5 mos.	2,524	21,868,877	3,391,147	27,256,319	3,724,950	5,177,518	728,396	10,635,513	815,079	21,216,884	77.80	6,039,435	4,875,343	3,485,308	2,625,328
Western Maryland	May	804	1,438,213	53,376	1,563,910	210,494	329,240	39,703	455,079	46,411	1,091,107	69.80	472,803	407,803	346,612	257,804
	5 mos.	804	7,300,395	271,221	7,959,264	1,047,243	1,718,116	186,054	2,422,493	226,975	5,655,528	71.10	2,303,736	1,988,736	1,721,514	1,549,125
Western Pacific	May	1,042	854,455	154,519	1,090,140	239,377	205,158	39,636	379,821	34,553	923,878	84.70	166,262	87,291	184,720	19,759
	5 mos.	1,042	3,998,984	655,271	4,994,744	859,593	1,001,657	186,843	1,929,249	178,390	4,244,103	85.00	750,641	355,034	901,171	422,540
Wheeling & Lake Erie	May	511	1,647,988	48,478	1,808,647	268,981	379,492	29,548	506,839	45,076	1,232,378	68.10	576,269	430,495	429,144	209,499
	5 mos.	511	7,033,767	243,619	7,744,234	894,378	1,936,560	145,835	2,504,097	214,012	5,706,994	73.70	2,037,240	1,416,907	1,413,950	1,045,832

General News Department

(*Continued from page* 104)

with claim prevention pictures. These are designed to familiarize the employee with the road for which he works, so that he in turn may disseminate information to acquaintances and thereby gain friends for the road. Pictures are shown at regular meetings of employees and recently a motor car was sent over the Missouri district for a week, stopping along the road to show pictures to employees and families in the stations in the evening. The large attendance showed the appreciation of the employees, the attendance at the regular meetings being larger than those without pictures. As a result of the popularity among employees, numerous requests have been received from Kiwanis and Rotary clubs and other organizations to have the pictures displayed at their meetings.

Among the pictures produced by the Burlington, one on car seals shows the proper way to seal a car. Another on the icing of refrigerator cars not only gives instruction in the proper way to ice, but demonstrates to employees other than those handling refrigerator cars the methods employed in large terminals. At the present time a picture is being made which explains the proper use of charcoal heaters to prevent damage. A picture of the Eola scrap yard shows how materials are handled and reclaimed and impresses upon one the efforts being made by the company to eliminate waste. News reels are being developed, which are of interest to both the employees and the public. One already produced is of the Chicago Union Station and shows construction work under way, the work completed, the interior arrangement, and methods of handling baggage and express. Another taken in Denver, Colo., includes pictures taken at an employees' meeting, Denver delegates to a Rotary club convention, and scenery in Denver. Besides using the camera for freight claim prevention work, employees and public relation work, it is planned to experiment in maintenance of way work, especially the inspection of bridges and right-of-way. All camera work is done by V. A. Leengran, supervisor of claims, along with his regular work.

Western Roads Encourage Boys and Girls Club Work

Western roads are co-operating with the National Committee on Boys' and Girls' Club Work, located in Chicago, to increase the attendance of boys and girls to 1,500 at the national convention which will be held in Chicago in conjunction with the International Livestock Exhibition next December. The attendance last year was 1,300. Each railroad will bear the expense of sending the winners of contests conducted by the extension department of some one of the several agricultural colleges to Chicago. Any boy or girl in a county where a county farm agent is employed in the states participating in the plan is eligible to contest for a prize trip. Details for such contests are arranged at the agricultural colleges and directed by the county farm agents. Contestants compete in the subjects in which they feel themselves best qualified and are judged on points for whatever demonstration they make. Subjects include field crops, livestock, gardening and domestic work.

Wage Statistics for April

Class I railroads reported to the Interstate Commerce Commission a total of 1,745,643 employees as of the middle of April, 1925, an increase of 23,368, or 1.4 per cent over the returns for the previous month. The maintenance of way group shows an increase of 40,710 employees, but this increase is offset somewhat by decreases in the maintenance of equipment and transportation groups. Notwithstanding the net increase in the number of employees, the total compensation $234,808,094, shows a decrease of $3,368,830, or 1.4 per cent, which resulted principally from a decrease in the number of hours worked per employee.

Compared with the returns for the same month last year, the employment in April, 1925, shows a decrease of 2.3 per cent and the total compensation a decrease of 0.9 per cent. The average straight time earnings per hour for all employees reported on an hourly basis increased from 57.4 cents per hour in April, 1924, to 58.2 cents in April, 1925.

The number of employees at the middle of the month was as follows:

Group	April 1925	Increase over March 1925	Increase over April 1924
Executives, officials, and staff assistants	16,509	21	198
Professional, clerical, and general	281,266	(d) 177	(d) 2,472
Maintenance of way and structures	379,377	40,710	(d) 14,972
Maintenance of equipment and stores	527,423	(d) 8,426	(d) 12,999
Transportation (other than train, engine, and yard)	206,821	(d) 1,476	(d) 1,969
Transportation (yardmasters, switch tenders, and hostlers)	23,901	(d) 454	(d) 1,266
Transportation (train and engine service)	310,346	(d) 6,830	(d) 8,094
Total	1,745,643	23,368	(d) 41,574

(d)—Decrease.

Railway Revenues and Expenses for May

Total operating revenues in May of Class I railroads, having a total mileage of 236,666 miles, amounted to $488,578,000, an increase of $11,141,200 or 2.3 per cent as compared with the same month last year, according to reports compiled by the Bureau of Railway Economics. Operating expenses totaled $375,732,700, a reduction of $5,748,400 or 1.5 per cent as compared with those for the same month last year, although the railroads in May this year carried approximately ten per cent more freight traffic than they did in May, 1924. The net railway operating income was $75,776,178, as compared with $60,861,155 in May last year, or an increase of $14,915,023.

The net railway operating income for the first five months this year amounted to $345,880,340, which was at the annual rate of return of 4.38 per cent on property investment, as compared with $326,480,500, or 4.27 per cent, for the same period last year.

Earnings by districts for the first five months this year, with return on property investment on an annual basis follow:

		Per cent
New England Region	$14,879,249	4.85
Great Lakes Region	70,875,519	5.45
Central Eastern Region	74,010,394	4.56
Pocahontas Region	23,173,921	6.52
Total Eastern District	182,939,083	5.10
Total Southern District	64,128,248	5.55
Northwestern Region	20,770,645	2.13
Central Western Region	47,191,246	3.22
Southwestern Region	30,851,119	4.29
Total Western District	98,813,010	3.13
United States	$345,880,341	4.38

Thirty Class I railroads operated at a loss in May, of which 8 were in the Eastern, 3 in the Southern and 19 in the Western Districts. In April, 34 had operating deficits.

Expenditures for maintenance made by Class I carriers in May totaled $175,845,729, a decrease of $2,857,669 or 1.6 per cent as compared with May last year. Maintenance of way expenditures totaled $72,460,750, a decrease of $1,314,600. Expenditures for maintenance of equipment totaled $103,384,980, a decrease of $1,543,000. In the Eastern district the net operating income in May was $44,591,500, as compared with $34,494,290 in May last year. Freight traffic in the Eastern district in May, according to incomplete reports, was nearly twelve per cent above that of the corresponding period last year. Gross operating revenues of the Eastern carriers totaled $250,970,200, an increase of nearly five per cent. Operating expenses totaled $187,812,700, an increase of one-tenth of one per cent. Class I carriers in the Eastern district in the first five months this year had a net operating income amounting to $182,939,083, as compared with $167,958,800 for the corresponding period last year.

Class I carriers in the Southern district in May had a net operating income of $10,943,568, as compared with $10,512,000 in May last year. Freight traffic on the Southern roads in May was about ten per cent above that of the same month last year. Gross operating revenues of the Southern carriers in May totaled $65,765,000, an increase of 1.8 per cent, while operating expenses totaled $50,242,455, a decrease of three-tenths of one per cent. The net operating income for the Class I railroads in the Southern district for the first five months this year was $64,128,248, as compared with $60,128,018 for the same period last year.

Carriers in the Western district had a net operating income in May of $20,241,100, as compared with $15,854,860 for the same month last year. Freight traffic in the Western district showed an increase of approximately 4 per cent. Gross operating revenues of the Western carriers totaled $171,842,900, a decrease of seven-tenths of one per cent, while operating expenses totaled $137,677,540, a decrease of 4.3 per cent. Class I carriers in the Western district in the first five months this year had a net operating income of $98,813,010, as compared with $98,393,661 for the same period one year ago.

Traffic News

Passenger traffic out of Chicago on July 2, 3 and 4 for the holidays exceeded that of last year by over 20 per cent. On the Chicago & North Western the holiday traffic on July 3 and 4 established a new high record. The increased volume of business was brought about by special rates of a fare and one-third for the round trip to all stations where the regular one-way fare is $7 or less. The Chicago, Rock Island & Pacific reported an increase of 20 per cent in its holiday traffic over that of last year. The New York Central operated ten extra sections on its through trains on July 2.

Excursions With Stop-Over Privileges Adopted to Increase Traffic

The Norfolk & Western, the Baltimore & Ohio, and the Pennsylvania have announced a series of tourist excursions from Columbus, Ohio, on stipulated dates on regular trains with 16-day stop-over privileges which will be run in addition to the one-day excursions which have been put into effect recently. The Norfolk & Western will run excursions to Norfolk, Va., on July 19 and August 16, with special rates for the trip and stop-overs at any point along the way. The Baltimore & Ohio will operate excursions to Atlantic City on July 13 and August 3, with stop-overs with 16-day return limits at Philadelphia, Baltimore, and Washington. On the same dates this company will also run low fare tourist excursions to Cape May, N. J., Wildwood, Sea Isle City and Ocean City. The Pennsylvania will operate low fare tourist excursions to Atlantic City on July 29 and August 12.

C. & N. W. Sunday Excursions Prove Successful

The results of the Sunday excursions operated by the Chicago & North Western on June 28, as described in the *Railway Age* of June 27, were so successful that additional excursions will be run on July 11 and 12. A comparison of the traffic shows that the regular traffic remained constant and that the excursions were extra business. It was found that the most popular excursions were those run into Chicago. Typical of the popularity was the excursion from Boone, Iowa, and Cedar Rapids to Chicago on June 27 and 28. This excursion ran in three sections, carrying 2,200 persons.

On July 11 and 12, eight excursions will be operated. These will be from Escanaba, Mich., to Chicago on July 11; from Green Bay, Wis., and from Des Moines, Ia., to Chicago on July 12; from Carroll, Ia., to Sioux City on July 12; from Lancaster, Wis., to Milwaukee on July 12; from Milwaukee to Madison on July 12; from Huron, S. D., to Rapid City on July 11, and from Elroy, Wis., to Milwaukee on July 12.

Agricultural Colleges Promote Safer and Better Farming

A bulletin issued by the Atchison, Topeka & Santa Fe indicates the value of the work done by the agricultural colleges and experiment stations in the territory traversed by this road in demonstrating how farming can be made more profitable. An inquiry shows that at present more farmers are availing themselves of the information furnished by these institutions than ever before and as a result they are avoiding the losses resulting from poor farming. The agricultural colleges are often unable through lack of funds or other causes, to reach the farmers quickly in emergencies with helpful information and under such conditions accept the aid of the railroads. The partial failures of the wheat crops in many wheat growing sections this season was an example and the Santa Fe offered to bear the expense of a safer farming special for each of the states of Kansas, Oklahoma, and Texas, and thereby made it possible to give the farmers the results of the latest experiments in growing wheat under such conditions in order that they might be successful in their fall planning. The Oklahoma and Texas specials have been run and the Kansas special is being run during the month of July.

Foreign Railway News

British Railways Propose Reductions for Officers and Employees Alike

The British railways have proposed general reductions in salaries and wages of all officers and employees of 5 per cent, giving as a reason the severe decline in traffic and reduced earnings. The unions have not accepted the proposal and are contending that the railway securities holders should accept a like reduction in their rate of return.

Harwich-Zeebrugge Train Ferry

The train ferry from Zeebrugge, Belgium, to Harwich, England, in May of the present year handled 855 cars with 5,978 long tons of freight from the Continent to England according to Modern Transport (London). In the same month of 1924 the traffic inbound to England on this route was but 84 cars and 451 long tons. Of the cars in May, 1925, 429 originated in Belgium and 333 in Italy. Traffic outbound from England on the route is very light, 30 new dining cars, each weighing 55 long tons, built in England for the International Sleeping Car Company, constituting virtually all of it in May.

Calais-to-Cairo by Rail May Soon Be Possible

There is but one missing link in a through standard-gage railway route from Calais to Cairo via Constantinople. The break is one of about 125 miles along the eastern shore of the Mediterranean between Tripoli in Syria and Haifa in Palestine, and forces are now at work trying to forge that link which would enable passengers and goods to be transported direct from the Gare Maritime at Calais to the banks of the Nile, says the Jerusalem correspondent of the Christian Science Monitor.

At present the through route runs via Calais to Paris, thence through Lyons, Turin, Milan to Udine and Trieste. It then goes on through Zagreb, Belgrade, Nish, Sofia, Philippopolis and Adrianopole to Constantinople. From there the Anatolian Railway carries on the extension through Afiun-Karahissar and Konia to Jenije. The line then runs east to Topran Kale, just north of Alexandretta, whence it turns in a southerly direction to Mussime, Home and Tripoli. South of this point, however, there is no standard gage railway till Haifa is reached.

Here the Palestine Railways, the successors of the Sinai military railway built by the army during the war, begins to run south through Ludd and Gaza to Kantara on the Suez Canal. From Kantara West, on the other side of the Canal, the Egyptian state railways run on to Cairo.

The French in Syria have expressed their readiness to complete the line from Tripoli to Beirut and Ras-el-Nakoura, the Syrian-Palestine frontier, if the Palestine government in its turn will carry on the extension to Haifa. General Weygand, the late French high commissioner in Syria, made a clear and emphatic statement on this point toward the end of last year. The colonial office has accordingly been approached in the matter, but they have expressed their unwillingness to provide the necessary funds.

Meanwhile, the Palestine Railways are urging the conversion of the existing narrow gage line from Haifa to Acre to a standard gage, with a view to extending it later to the frontier as soon as funds are available. The decision of the colonial office on this point is not yet known.

The linking up of Tripoli, Beirut, and Haifa would be a great economic asset in many ways. It would enable the railways to compete with sea traffic between Egypt and the Lebanon, and would enable passengers to travel in comfort with dining and sleeping cars from Egypt to Beirut in less than 24 hours.

The Bagdad Railway is another factor which is closely connected with this project, as there is little doubt that in the near future that line will have to be completed to Mosul and Bagdad. It is, therefore essential that it should eventually have a connection with Egypt and the Nile, as well as with Europe.

The French Railways in 1924

The annual reports of the five principal French railways for the year 1924 which have recently been issued show marked progress for last year over the results of 1923 as can be seen from the following figures received by the Bankers Trust Company of New York from its French information service which show the profits and operating ratio of each one of the different companies during the past two years:

Operating results of French railways

	Net earnings		Operating ratio	
	1924	1923	1924	1923
	Millions of francs			
Northern	291	125	79.5	89
Eastern	270	187	78.77	82.4
P. L. M.	481	283	79.95	85.5
Paris-Orleans	136	113	88.43	89
Southern	73	24	87	94.9
Total	1,251	732	82.7	88.1

While one of the principal causes of this improvement can be attributed to the increase of rates which went into effect in March, the lines also benefited by the briskness of trade (as is shown by an increased number of car-loadings) and by improved operation, so that had it not been for extra charges under the heading of wages and allowances which they were compelled to assume towards the end of the year owing to the general rise of prices the five companies would have been able to reduce their combined deficit of 700,000,000 francs after charges in 1923 to less than the 300,000,000 at which it actually stands for the past year.

The final results of the companies suffer from the fact that under the law of 1921 they must combine their accounts with those of the State lines. The Alsace-Lorraine system, thanks to absence of heavy debt, contributes 88,000,000 francs to the common fund, but the old State Railways have to draw upon it to the extent of 280,000,000 francs, according to the provisional returns. Final results for the seven grouped systems therefore show a deficit amounting to rather less than 500 million francs which is considerably below the 1923 deficit of 1,124 million francs and it is foreshadowed in the annual reports that within the next two or three years this deficit will have been completely eliminated.

Total receipts exceeded those for 1923 by 1,100,000,000 francs, but, since expenses rose by 578,000,000 francs, the final increase is little more than 500,000,000 francs. Passenger revenue represented 26.8 per cent of the total, against 25 per cent in 1923, and freight (*petite vitesse*) 61.3 per cent, against 63 per cent.

It is noteworthy that the State Railways have for the first time succeeded in reducing their operating ratio below 100, actually 99.02 per cent. They are handicapped by heavy loss on suburban traffic around Paris, which is carried at very low rates, and by the fact that they serve an area of France which is not industrial and also for the most part poor agriculturally.

Heavy capital charges swallow up nearly all of the operating receipts of the Northern and the Eastern and more than all of those of the P. L. M., the Paris-Orleans, the Southern and the State. To these must be added the sums reserved for guaranteed minimum dividends and the premiums allowed to the company, or the personnel according to increase of traffic and decrease of deficits, as fixed by the Railway Act. In the final analysis therefore the results of the different companies show the following comparison between last year and 1923:

	In millions of frs.	
	1924	1923
Northern	—30	—160
Eastern	—41	—21
P. L. M.	—51	—195
Paris-Orleans	—171	—180
Southern	—87	—123
State*	—280	—423
Als.-Lorraine*	—88	—3

*Provisional.

During the present year, the French railways will have to meet extra costs due both to modification in the application of the eight-hour day for the benefit of the employees and to higher wages and allowances. An increase in freight rates was sanctioned at the beginning of this year which should help to increase revenue although this increase will be offset at least partially by a contraction in receipts from the reduction in business during the first months of the year. In this connection it is interesting to note, according to the Nord report, that in actual values the present rates for freight traffic are on a level with the rates of 1913 while passenger fares are 25 to 30 per cent below those of 1913.

Equipment and Supplies

Locomotives

THE CENTRAL OF GEORGIA is inquiring for 10 Santa Fe type locomotives.

THE LAKE TERMINAL has ordered 2 eight-wheel switching locomotives from the American Locomotive Company, New York City.

THE GUANTANAMO & WESTERN, Cuba, has ordered 2 Consolidation locomotives from the American Locomotive Company, New York City.

THE PUNTA ALEGRE SUGAR COMPANY (Cuba) has ordered one Consolidation locomotive from the American Locomotive Company. This locomotive will have 19 in. by 26 in. cylinders and a total weight in working order of 138,000 lb.

THE CHESAPEAKE & OHIO has let contracts to rebuild 30 Mallet type locomotives as follows: Twenty of these locomotives will be rebuilt by the Richmond branch of the American Locomotive Company, and the remaining ten by the Newport News Shipbuilding & Dry Dock Company, Newport News, Va.

THE RICHMOND, FREDERICKSBURG & POTOMAC has ordered 2 Pacific type locomotives from the Baldwin Locomotive Works. These locomotives will have 26 in. by 28 in. cylinders, and the total weight of each engine and tender will be 494,360 lb. An order has also been placed with the American Locomotive Company for 2 Mountain type locomotives and 2 six-wheel switching locomotives. The Mountain type locomotives will have 28 in. by 30 in. cylinders and the total weight of each engine and tender will be 582,600 lb. The six-wheel switching locomotives will have 21 in. by 28 in. cylinders, and the total weight of each engine and tender will be 292,000 lb. In the *Railway Age* of June 27 it was reported that this road contemplated buying 6 locomotives.

Freight Cars

THE CENTRAL OF GEORGIA is inquiring for 1,000 ventilated box cars of 40 tons' capacity.

THE NATIONAL RAILWAYS OF MEXICO are inquiring for 50 ballast cars of 50 tons' capacity.

THE IROQUOIS GAS CORPORATION, Buffalo, N. Y., has ordered 2 steel hopper cars, of 55 tons' capacity and 2 steel underframe gondola cars, of 50 tons' capacity, from the American Car & Foundry Company.

THE GREAT NORTHERN has increased its order to the Siems-Stembel Company from 1,000 to 2,000 steel underframes, involving a total of 7,000 tons of steel. The previous order was reported in the *Railway Age* of July 4.

Passenger Cars

THE NEW YORK CENTRAL has ordered 6 combination passenger and baggage gasoline rail motor cars, from the J. G. Brill Company.

Pennsylvania Places Orders for Passenger Equipment to Cost $6,000,000

The Pennsylvania has placed orders for 357 passenger cars of all steel construction, to be delivered as soon as equipment companies can complete their construction. The orders call for 222 baggage cars, 105 passenger coaches, 15 combination passenger and baggage cars, 10 combination baggage and mail cars and 5 combination passenger, baggage and mail cars. The estimated cost of this equipment is $6,000,000.

Machinery and Tools

THE BOSTON & MAINE is inquiring for three 25-ton locomotive cranes.

THE LEHIGH VALLEY is inquiring for two 35-ton locomotive cranes.

THE CANADIAN NATIONAL is inquiring for one 35-ton locomotive crane.

THE CHESAPEAKE & OHIO has placed an order for a 12-ft. pneumatic plate flanging clamp.

THE CHICAGO, BURLINGTON & QUINCY is preparing a list of machine tools and will soon issue inquiries.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for one 100-ton motor-driven driving box press with a 24-in. stroke and 36 in. between columns.

Iron and Steel

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is inquiring for 100 tons of structural steel.

THE READING has ordered about 225 tons of bridge steel from the Bethlehem Steel Corporation.

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for 800 tons of structural steel for use at Old Fort, Ohio.

THE CHICAGO, BURLINGTON & QUINCY has ordered 157 tons of structural steel from the American Bridge Company.

THE CHESAPEAKE & OHIO has ordered 200 tons of steel for a bridge in West Virginia, from the American Bridge Company.

Track Specialties

THE ILLINOIS CENTRAL has ordered 4,000 tons of tie plates from the Sellers Manufacturing Company.

Miscellaneous

THE NEW YORK CENTRAL RAILROAD received bids until 12 o'clock noon, July 2, for its requirements of black, galvanized and blue annealed sheets, seamless steel tubes, cars and tender truck axles, wire nails and staples, steel bars, steel shapes, steel plates and steel billets. Bids are wanted by the New York Central Lines until 12 o'clock noon, July 7, covering their requirements for steel wheels.

Signaling

THE DETROIT & MACKINAC has ordered materials from the Union Switch & Signal Company for the installation of highway crossing signals, including the necessary track circuit materials, to be installed at Washington avenue and Chisholm street, Alpena, Mich.

THE SEABOARD AIR LINE is arranging to install a mechanical interlocking plant at Okeechobee, Fla., for which the materials have been ordered from the Union Switch & Signal Company. The field installation will be handled by the railway company's signal construction forces.

THE SOUTHERN PACIFIC LINES IN TEXAS AND LOUISIANA have placed orders with the Union Switch & Signal Company for materials for 76 one-arm and 27 two-arm style "B" signals with the necessary d.c. relays, etc., for block signal installation on 65 miles of the line between Withers and Cline, Texas; also 17 one-arm and one two-arm style "B" signals for installation between Avondale and Algiers, La.

THE PENNSYLVANIA has bought a complete new electro-pneumatic interlocking machine having seventeen working levers and six spare spaces for installation at "VI" Cabin, Brilliant, Pa.; also five style "S-8" electro-mechanical units with the necessary supports, etc., for application to the existing mechanical interlocking machine at Bucyrus, Ohio. These materials are being furnished by the Union Switch & Signal Company and will be installed by the railroad company's signal construction forces.

Supply Trade News

The Long Bell Lumber Company has awarded a general contract to Grant Smith & Company for 12 one-story additions to its mill at Longview, Wash., to cost approximately $300,000.

The Crane Company, Chicago, is contemplating the construction of a two-story factory branch and distributing building on De Deboise place, Brooklyn, N. Y., 100 by 120 ft., to cost $75,000.

The Bucyrus Company, South Milwaukee, Wis., has appointed the **Clyde Equipment Company,** with offices in Portland, Ore., and Seattle, Wash., its sales representative for the northwest, in the states of Washington, Oregon and northern Idaho.

F. J. Page, formerly district manager of the Milwaukee Electric Crane & Manufacturing Company, and **R. E. Ludwick,** formerly representative of the Whiting Corporation, have established a sales office at 14 East Jackson boulevard, Chicago, and will represent the **Milwaukee Electric Crane & Manufacturing Company** and other material handling equipment companies.

The French Battery & Carbon Company, Madison, Wis., has changed its name to the **French Battery Company** and has increased its preferred stock from $700,000 to $1,500,000. Under the re-financing plan adopted by stockholders, $1,000,000 in five-year convertible 6½ per cent gold notes will also be issued. The company will specialize on the production of dry batteries and flashlights. There will be no changes in personnel.

Robert Miller has been appointed manager of the Rocky Mountain sales district of the **General Electric Company,** succeeding **Harry D. Randall,** who is on leave of absence because of ill health. Mr. Miller's headquarters are at Denver, Colo. **B. J. Wheatlake** succeeds Mr. Miller as local office manager at Salt Lake City and Mr. Randall has been assigned to special duties at the general office of the company, Schenectady, N. Y.

Frank Rhea, who has been serving for a number of years as a representative of the United States Department of Commerce in the Orient, has left that service and returned to the United States. Mr. Rhea has been acting American commercial attache for Japan, with headquarters at Tokyo, since December, 1924, and prior to that time served as registrar of American companies organized under the Chinese Trade Act, with headquarters at Shanghai. Mr. Rhea's headquarters will be at the Cosmos Club, Washington, D. C.

Raymond B. Hosken, assistant to the vice-president in change of sales of the **Sullivan Machinery Company,** Chicago, has been promoted to general sales manager. He entered the employ of the Sullivan Machinery Company in the local sales department in Chicago after graduating from the University of Michigan in 1910. In 1914 he was promoted to Australasian manager, with headquarters in Sydney, N. S. W., and in 1921 he was promoted to assistant to the vice-president in charge of sales at Chicago, which position he has held until his recent promotion.

The Duff Manufacturing Company, Pittsburgh, Pa., at a recent meeting of the board, made a number of changes in the officers and organization. The officers of the company are now as follows: **J. R. McGinley,** chairman; **Thomas A. McGinley,** president; **P. G. O'Hara,** vice-president; **C. N. Thulin,** vice-president; **E. M. Webb,** general manager; **F. O. Graham,** secretary, and **D. J. Greiner,** assistant treasurer. J. R. McGinley, the newly elected chairman of the board, has been president of the Duff Manufacturing Company for almost 25 years. He has been identified with manufacturing industries for many years also with the Westinghouse interests, and until recently was chairman of the board of the Chicago Pneumatic

Tool Company. Thomas A. McGinley, the new president, is also a director of the Westinghouse Air Brake Company and of the Union Switch & Signal Company, Pittsburgh. He has been associated with the Duff Manufacturing Company for over 20 years and for the past ten years has been vice-president and general manager. The sales department will be under the supervision of P. G. O'Hara and Charles N. Thulin, newly appointed vice-presidents. Mr. O'Hara for a number of years was associated with the Galena-Signal Oil Company, first in New York and later as district manager at Cincinnati. He is in charge of the eastern sales division, comprising the eastern, southeastern, central and southern district offices. Mr. O'Hara's headquarters are at the company's New York office, 250 Park avenue. C. N. Thulin, who has been made vice-president in charge of the western sales division, having jurisdiction over the company's main offices and representatives in the middle west, southwest, mountain states and Pacific coast, has for the past ten years served as district manager in the Chicago district, and his headquarters, as heretofore, will be in the Peoples Gas building, Chicago.

June Locomotive Shipments

The Department of Commerce has prepared the following table showing shipments of locomotives from the principal manufacturing plants in June, with comparisons:

	Locomotives					
	Shipments			Unfilled orders end of month		
Year and month	Total	Domestic	Foreign	Total	Domestic	Foreign
1923						
January	229	217	12	1,788	1,699	89
February	207	196	11	2,220	2,141	79
March	282	269	13	2,316	2,214	102
April	217	201	16	2,204	2,111	93
May	238	228	10	2,150	2,045	105
June	232	221	11	1,958	1,854	104
Total 6 months	1,405	1,332	73	.....	.....	...
1924						
January	151	147	4	376	344	32
February	99	92	7	499	466	33
March	132	128	4	534	494	40
April	73	63	10	640	586	54
May	111	93	18	643	589	54
June	145	134	11	531	462	69
Total 6 months	711	657	54	.....	.....	...
1925						
January	90	45	45	407	351	56
February	85	73	12	397	343	54
March	109	93	16	447	351	96
April	92	82	10	477	362	115
May	96	68	28	467	353	114
June	110	61	49	397	300	97
Total 6 months	582	422	160	.....	.....	...

Obituary

Thomas J. Hyman, secretary and treasurer of the Illinois Steel Company, Chicago, died on July 5.

Trade Publications

WHAT RUST CAN DO.—The Detroit Graphite Company has issued a folder showing various types of structures exposed to the elements and emphasizing the deterioration that occurs unless they are properly protected, setting forth the merits of its Degraco paint for this purpose.

THE DRILL FOR TODAY.—In a 16-page pamphlet the Detroit Twist Drill Company, Detroit, Mich., presents an account of the conditions leading to the development of the rolled type of twist drill. It is an interesting story containing much information of value to the user of drills.

PACKINGS.—Catalog A-1925 outlining the features of Garlock service and describing and illustrating its general line of packings—asbestos, rubber, metal and fibrous—gaskets, pump valves, valve discs, etc., has been issued by the Garlock Packing Company, Palmyra, N. Y. Colored illustrations are interspersed throughout the 176 pages of this catalog, which is attractively bound in black leather.

CLEVELAND TWIST DRILL CATALOG.—The Cleveland Twist Drill Company, Cleveland, Ohio, has issued Catalog No. 41, a book of 244 pages, which covers a complete line of drills manufactured by this company. In addition to illustrations and tables of dimensions and sizes of the various drills this catalog contains much information of value to users of drills, tables of cutting speeds, etc. A number of new items on the list of this manufacturer's products are covered in this catalog for the first time.

DIESEL ENGINE BUILDING.—Bulletin No. 1040, entitled "Modern Methods in Diesel Engine Building," has recently been issued by Fairbanks, Morse & Co., Chicago, Ill. An attempt is made in this attractive 32-page bulletin to picture the present-day engineering refinements that enter into the construction of Diesel engines and what these refinements mean to the purchaser, each step in the process of manufacture of an engine, from the selection of the raw material to the final inspection and application of the finished product, being described.

CHEMICAL ENGINEERS.—Railroad men, both prospective and long-time users of Dearborn chemical service, will find much of interest in an attractively prepared booklet, "A House of Chemical Engineers," recently issued by the Dearborn Chemical Company, Chicago. For many years this company has been prescribing and blending the chemicals required to correct scaling, foaming, pitting, and corroding conditions in the boilers of locomotives and power plants operated by the railroads and other industries, thus conserving fuel and rendering more permanent the investments in power plant machinery. The booklet referred to contains 39 5½-in. by 8-in. pages and presents in attractive form a pictorial record of the Dearborn plant, its laboratories, storage tanks, manufacturing department and organization. Pictures of the officers of the company, beginning with Robert F. Carr, president, are included.

FREIGHT CARS ORDERED, INSTALLED AND RETIRED

Month 1924	Domestic orders reported during month	Installed during month	Aggregate capacity tons	Retired during month	Aggregate capacity tons	Owned at end of month	Aggregate capacity tons	On order as of first of following month	Building in R. R. shops
January	6,020	15,589	707,367	12,329	516,695	2,310,032	100,644,107	21,696	2,417
February	18,365	11,386	554,481	10,466	411,228	2,310,570	100,767,731	40,030	2,715
March	35,846	9,962	446,094	8,726	352,481	2,311,405	101,165,332	62,340	2,697
April	11,189	8,718	369,978	8,026	306,288	2,312,074	101,223,891	62,289	2,739
May	435	9,199	439,516	9,059	360,214	2,312,237	101,303,200	57,266	2,467
June	387	10,909	538,118	8,347	321,094	2,314,798	101,569,593	57,735	2,269
July	533	16,583	1,151,302	8,413	316,927	2,322,968	102,388,652	51,156	4,602
August	4,751	15,452	785,288	8,834	333,173	2,329,582	102,845,000	40,961	3,618
September	22,520	15,455	779,078	9,337	370,607	2,336,147	103,270,000	47,553	3,045
October	11,853	16,598	834,762	10,504	*418,816	2,342,149	103,688,000	[1]38,403	[2]3,574
November	13,038	11,705	579,234	10,678	463,970	2,342,479	103,767,000	42,765	5,159
December	9,526	6,763	311,254	11,918	488,035	2,337,229	103,585,000	54,202	6,478
January, 1925	10,312	11,768	551,263	7,867	326,812	2,341,109	103,812,974	58,910	5,285
February	5,388	15,024	721,867	9,453	365,111	2,346,687	104,169,525	50,603	4,878
March	4,677	16,007	753,947	12,067	474,644	2,350,697	104,454,128	45,419	5,572
April	5,525	13,749	652,462	10,497	423,322	2,353,956	104,683,798	42,602	8,072
May	8,944	12,982	612,607	8,658	335,401	2,356,641	104,902,235	35,823	9,042
June	777	.....	.....	.....	.....	.....	.....	.....	.....
Total for 5 months	.....	69,530	.....	.....	.....	.....	.....	.....	.....
Total for 6 months	35,623	.....	.....	.....	.....	.....	.....	.....	.....

*Corrected figure.

[1]Details as to orders from *Railway Age* weekly reports. Figures include all domestic orders placed with builders and railroad shops but not rebuilt equipment.

[2]Figures as to installations and retirements prepared by Car Service Division A. R. A. Figures cover only those roads reporting to the Car Service Division. They include equipment received from builders and railroad shops. Figures of installations and retirements alike include also equipment rebuilt to an extent sufficiently so that under the accounting rules it must be retired and entered in the equipment statement as new equipment. The figures as to orders as given in the first column of table are not comparable with figures relating to installations given in succeeding columns.

Railway Construction

ATCHISON, TOPEKA & SANTA FE.—Plans have been prepared for the construction of several miles of second track and passing track in the vicinity of Colton, Cal. A contract has been awarded to the McKee Construction Company, El Paso, Texas, for the construction of a 12-stall reinforced concrete roundhouse at Hutchinson, Kan., which will cost $100,000.

BANGOR & AROOSTOOK.—This company has awarded a contract to the Eyre-Johnston Company, Philadelphia, for the erection (labor only) of a marine pier at Searsport, Me., to cost approximately $350,000.

BIG SANDY & CUMBERLAND.—This company, a subsidiary of the Norfolk & Western, has applied to the Interstate Commerce Commission for a certificate authorizing the construction of an extension from Hurley, Va., to a point on the eastern bank of Levisa Fork of the Big Sandy river, 14.08 miles, to cost approximately $2,500,000.

CHICAGO & NORTH WESTERN.—This company has applied to the Interstate Commerce Commission for permission to abandon 16 miles of narrow-gage line between Fennimore, Wis., and Woodman. In 1923 the cost of operating this line was more than five times the total receipts.

COWLITZ, CHEHALIS & CASCADE.—Bids will be received until July 15 for the construction of a 14-mile extension from Lacamas, Wash., to Mossy Rock.

ERIE.—Approximately 150,000 sq. ft. of dock property on the north branch of the Chicago river has been purchased for a consideration of $254,000 to be used as a site for a freight station. The present facilities have been greatly reduced by the widening of Ashland avenue, Chicago.

GULF COAST LINES.—Surveys have been made for a 30-mile branch from Edinburg, Texas, to Raymondville, with a total of 20 miles of short feeder lines.

ILLINOIS TERMINAL.—This company has purchased seven miles of the line of the St. Louis, Troy & Eastern between Edwardsville, Ill., and Troy for a consideration of $200,000. The construction of an extension to a point near O'Fallon, Ill., at a cost of $600,000, is contemplated.

LONG ISLAND.—The New York Public Service Commission has approved this company's plans for the elimination of a grade crossing at Southold, L. I.

LOS ANGELES & SALT LAKE.—A contract has been awarded to the Lynch Construction Company, Los Angeles, Cal., for the construction of a freight station, 312 ft. by 34 ft., together with additional yard tracks and loading platforms, at Pasadena, Cal.

LOS ANGELES JUNCTION.—This company and the Central Manufacturing District, Inc., have been authorized by the Interstate Commerce Commission to construct 7.6 miles of railroad in the vicinity of Los Angeles, Calif., to provide railroad connections for various industries in an area now being developed industrially.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—Company forces will enlarge the yards at Superior, Wis., at a cost of approximately $85,000.

SOUTHERN PACIFIC.—If plans for the acquisition of substantial interests in the Nevada-California-Oregon and the Oregon, California & Eastern are approved by the Interstate Commerce Commission, it is planned to construct an extension of the latter road from Sprague River, Ore., the present eastern terminus, east to Lakeview where connection will be made with the Nevada-California-Oregon. In conjunction with its own Natron cutoff, these links will provide a new route from Oregon to the east.

UNION PACIFIC.—Bids are being taken for the construction of a storehouse, 40 ft. by 316 ft., at Council Bluffs, Iowa, to cost approximately $60,000.

Railway Financial News

AMERICAN RAILWAY EXPRESS COMPANY.—*Six Months Guaranty.*—The Interstate Commerce Commission has issued a final certificate fixing the amount of this company's guaranty for the six months period following the termination of federal control at $19,700,000, of which $2,010,788 remained to be paid on the final certificate.

ATLANTIC COAST LINE.—*Certificate for Operation.*—This company has applied to the Interstate Commerce Commission for a certificate authorizing it to operate the Fort Myers Southern, of which it owns the entire stock.

CAPE GIRARDEAU NORTHERN.—*Sale.*—The sale of the Cape Girardeau Northern will be held at Cape Girardeau, Mo., during the July term of the Common Pleas Court. The road will be sold either in its entirety or in three sections, the minimum price on the entire line being $775,000.

CHICAGO, ROCK ISLAND & PACIFIC.—*Equipment Trust Certificates.*—This company has applied to the Interstate Commerce Commission for authority to guarantee an issue of $5,400,000 of 4½ per cent equipment trust certificates, to be sold to Speyer & Co., at 96.89.

KENTUCKY & INDIANA TERMINAL.—*Bonds.*—The Interstate Commerce Commission has granted authority to this company to procure the authentication and delivery of $250,000 first mortgage gold bonds to be held subject to the further order of the commission. The company's application asked for authority to procure the authentication of $541,000 of bonds.

NEW YORK, CHICAGO & ST. LOUIS.—*Motion to Deny Intervening Petition.*—J. J. Bernet, president, and W. A. Colston, general counsel, of the New York, Chicago & St. Louis, have filed with the Interstate Commerce Commission a further answer to the intervening petition of the so-called Scott committee, representing minority stockholders of the Chesapeake & Ohio, which had asked the commission to rescind its order authorizing directors of the Nickel Plate to become directors of the Chesapeake & Ohio. Asserting that the petition in intervention is part of a "deliberate attempt to obstruct and prevent the merger within proper limits of lines and facilities of common carriers subject to governmental control, such as was specifically recommended to Congress by the commission in its annual reports of 1918 and 1919," they ask that certain paragraphs be struck out for scandal and impertinence and that the petition be denied and dismissed. They object particularly to the "scandal and impertinence involved in the allegation as to despoiling minority stockholders of the Chesapeake and Hocking companies, as to deliberate suppression and withholding of information from stockholders, as to using the corporate, executive and operating organizations of said companies and the financial resources thereof for the purpose of carrying out a scheme for taking the properties of the said companies away from their stockholders and improperly transferring them to the proposed new company, and as to the diversion of the activities of the directors, officers and resources of said companies for the promotion or development of a plan or scheme to the interest of the Messers. Van Sweringen and their associates and to the prejudice of the other stockholders of said companies; furthermore, particularly as to the allegations or insinuations that the officers and directors of said companies have been unfaithful to their trusts."

Notes. The Interstate Commerce Commission has granted authority to this company as follows:

To issue two 6-months 4½ per cent promissory notes, one for $8,138,750 and the other for $1,436,250, the proceeds to be used to pay $9,575,000 of Toledo, St. Louis & Western prior-lien 3½ per cent gold bonds maturing July 1, 1925.

To issue $10,000,000 of Toledo, St. Louis & Western Railroad Company first mortgage 4 per cent gold bonds in exchange for a like amount of Toledo, St. Louis & Western prior-lien 3½ per cent gold bonds; said bonds so issued in exchange to be pledged with the trustee under applicant's refunding mortgage.

(*Continued on page* 118)

Annual Report

Michigan Central Railroad Company — Seventy-Ninth Annual Report

To the Stockholders of

THE MICHIGAN CENTRAL RAILROAD COMPANY:

The Board of Directors herewith submits its report for the year ended December 31, 1924, with statements showing the income account for the year and the financial condition of the company.

The year's business

During the year the company moved 29,273,172 tons of revenue freight and carried 4,744,091 revenue passengers. Compared with 1923, there was a decrease of 3,050,076 in tons carried. The greater part of this decrease in tonnage was in bituminous coal, due in large measure to the substantial use made by industries of coal stored prior to 1924. Lessened activity in the iron and steel industry is reflected in decreased tonnage of finished metal products and related commodities. There was also a falling off in the tonnage of automobiles and auto-trucks handled. Lumber shipments decreased, largely as a result of building conditions. While the sugar beet crop was a good one, the company's tonnage of this commodity was adversely affected by the extensive use of motor trucks in moving it. There was a decrease in passengers carried of 247,359.

INCOME ACCOUNT FOR THE YEAR

	Year ended Dec. 31, 1924	Year ended Dec. 31, 1923	Increase or Decrease
Operating income:	1,862.25 *miles operated*	1,862.67 *miles operated*	*mile* .42
Railway operations—			
Railway operating revenues	$87,614,662.39	$94,798,042.04	—$7,183,379.65
Railway operating expenses	62,159,524.30	67,639,531.88	—5,480,007.58
Net revenue from railway operations	$25,455,138.09	$27,158,510.16	—$1,703,372.07
Percentage of expenses to revenues	(70.95)	(71.35)	(.40)
Railway tax accruals	$5,584,590.38	$5,615,543.77	—$30,953.39
Uncollectible railway revenues	30,515.20	24,700.21*	55,215.41
Railway operating income	$19,840,032.51	$21,567,666.60	—$1,727,634.09
Equipment rents, net debit	$312,265.52	$1,619,002.35	—$1,306,736.83
Joint facility rents, net debit	542,483.65	560,488.88	—18,005.23
Net railway operating income	$18,985,283.34	$19,388,175.37	—$402,892.03
Miscellaneous operations—			
Revenues	$420,948.72	$374,814.29	$46,134.43
Expenses and taxes	387,868.26	310,004.32	77,863.94
Miscellaneous operating income	$33,080.46	$64,809.97	—$31,729.51
Total operating income	$19,018,363.80	$19,452,985.34	—$434,621.54
Non-operating income:			
Income from lease of road	$10.00	$75,086.71†	$75,096.71
Miscellaneous rent income	171,403.50	163,125.40	8,278.10
Miscellaneous non-operating physical property	84,984.92	71,960.79	13,024.13
Dividend income	489,881.21	598,954.50	—109,073.29
Income from funded securities	77,713.80	143,474.78	—65,760.98
Income from unfunded securities and accounts	276,303.24	552,454.06	—276,150.82
Miscellaneous income	3,664.29	156,856.18†	160,520.47
Total non-operating income	$1,103,960.96	$1,298,026.64	—$194,065.68
Gross income	$20,122,324.76	$20,751,011.98	—$628,687.22
Deductions from gross income:			
Rent for leased roads	$2,734,781.88	$2,736,451.16	—$1,669.28
Miscellaneous rents	4,507.84	4,256.90	250.94
Miscellaneous tax accruals	21,496.50	15,104.14	6,392.36
Interest on funded debt	3,541,245.42	3,201,121.03	340,124.39
Interest on unfunded debt	5,869.75	440,061.62	—434,191.87
Amortization of discount on funded debt	177,927.00	155,564.98	22,362.02
Maintenance of investment organization	1,775.30	1,781.95	—6.65
Miscellaneous income charges	7,187.35	20,222.20	—13,034.85
Total deductions from gross income	$6,494,791.04	$6,574,563.98	—$79,772.94
Net income	$13,627,533.72	$14,176,448.00	—$548,914.28
Disposition of net income:			
Dividends declared (20 per cent each year)	$3,747,280.00	$3,747,280.00	.....
Surplus for the year carried to profit and loss	$9,880,253.72	$10,429,168.00	—$548,914.28

* Credit balance. † Debit balance.

PROFIT AND LOSS ACCOUNT

Balance to credit of profit and loss, December 31, 1923		$47,905,794.18
Additions:		
Surplus for the year 1924	$9,880,253.72	
Unrefundable overcharges	5,372.79	
Premium on sale of United States Government Liberty Loan bonds and Treasury notes	12,205.64	9,897,832.15
		$57,803,626.33
Deductions:		
Depreciation prior to July 1, 1907, on equipment retired during 1924	$46,075.17	
Road property abandoned and not replaced	320,961.04	
Adjustment of certain accounts with the Director General of Railroads not included in the final settlement for the period of federal control	315,632.75	
Uncollectible accounts	97,706.04	
Various miscellaneous items (net)	26,427.91	806,802.91
Balance to credit of profit and loss, December 31, 1924		$56,996,823.42

Operating revenues

The total operating revenues were $87,614,662.39, a decrease of $7,183,379.65.

Freight revenue was $58,463,966.84, a decrease of $5,674,713.70. The decrease in total revenue tons carried was 3,050,076. The falling off in bituminous coal carried was 2,189,778 tons, or 71.79 per cent of the total decrease.

Passenger revenue was $20,598,595.20, a decrease of $868,-062.45. There was a decrease in total passengers carried of 247,359, a decrease in local and commutation passengers of 288,128 being partly offset by an increase of 40,769 in interline passengers.

Mail revenue was $978,437.52, an increase of $50,305.25, mainly attributable to increase in traffic.

Express revenue was $3,957,000.38, a decrease of $468,743.47, due to a falling off in volume of business handled.

Other transportation and incidental revenues aggregated $3,616,-662.45, a decrease of $222,165.28, which is largely accounted for by a decrease in demurrage, reflecting the falling off in tonnage handled.

Operating expenses

The following table shows the operating expenses by groups for 1924 compared with those for 1923:

Group	Amount	Decrease
Maintenance of way and structures	$11,177,679.27	$239,296.27
Maintenance of equipment	16,457,962.29	3,662,185.06
Traffic	1,250,026.26	46,370.73*
Transportation	30,494,421.07	1,726,294.80
Miscellaneous	996,459.19	29,884.51*
General	1,877,830.45	94,905.88*
Transportation for investment—credit	94,854.23	23,392.57
Total	$62,159,524.30	$5,480,007.58

* Increase.

Net corporate income

After charges for dividends there remained a surplus of $9,880,253.72, which was carried to the credit of profit and loss.

Changes in funded debt

The changes in the funded debt of the company, in detail, were as follows:

The funded debt outstanding on December 31, 1923, was $75,361,308.28

It has been increased as follows:

N. Y. C. Lines Equipment Trust 5 per cent certificates of June 1, 1924	$3,495,000.00	
N. Y. C. Lines Equipment Trust 4½ per cent certificates of September 15, 1924	2,595,000.00	6,090,000.00
		$81,451,308.28

Payments falling due during the year and on January 1, 1925, on the company's liability for principal installments under equipment trust agreements as follows:

N. Y. C. Lines Trust of 1910, January 1, 1925	$393,960.40	
N. Y. C. Lines Trust of 1912, January 1, 1925	151,710.90	
N. Y. C. Lines Trust of 1913, January 1, 1925	262,359.54	
M. C. R. R. Trust of 1915, October 1, 1924	300,000.00	
M. C. R. R. Trust of 1917, March 1, 1924	600,000.00	
Trust No. 48 (1920), January 15, 1924	346,400.00	
M. C. R. R. Co. proportion of N. Y. C. R. R. Co. Trust of 1920, April 15, 1924	467,664.75	
N. Y. C. Lines Trust of 1922, June 1, 1924	373,000.00	
N. Y. C. Lines 4½ per cent Trust of 1922, September 1, 1924	51,000.00	
N. Y. C. Lines Trust of 1923, June 1, 1924	632,000.00	3,578,095.59
leaving the funded debt on December 31, 1924		$77,873,212.69

a net increase of $2,511,904.41.

[ADVERTISEMENT]

New York Central Lines Equipment Trust of 1924

This trust was created by agreement dated June 1, 1924, to which The New York Central Railroad Company, The Michigan Central Railroad Company, The Cleveland, Cincinnati, Chicago and St. Louis Railway Company and The Cincinnati Northern Railroad Company are parties. Under the trust $25,050,000 of 5 per cent equipment trust certificates maturing in equal annual installments of $1,670,000 over a period of fifteen years were issued, representing approximately 75 per cent of the cost of the equipment leased by the Trustee to the railroad companies. The equipment allotted to this company under the trust, costing $4,697,728.45, consists of 15 Mikado locomotives, 10 switching locomotives, 15 coaches and 1,000 auto box cars. The certificates are prorated among the railroad companies in proportion to the cost of the equipment allotted to each, this company's share being $3,495,000.

New York Central Lines Four and One-Half Per Cent Equipment Trust of 1924

This trust was created by agreement dated September 15, 1924, to which The New York Central Railroad Company, The Michigan Central Railroad Company and The Cleveland, Cincinnati, Chicago and St. Louis Railway Company are parties. Under the trust $20,955,000 of 4½ per cent equipment trust certificates maturing in equal annual installments of $1,397,000 over a period of fifteen years were issued, representing approximately 75 per cent of the cost of the equipment leased by the Trustee to the railroad companies. The equipment allotted to this company under the trust, estimated to cost $3,468,059.40, consists of 5 Pacific passenger locomotives, 3 dining cars, 20 baggage cars and 1,000 box cars. The certificates are prorated among the railroad companies in proportion to the cost of the equipment allotted to each, this company's share being $2,595,000.

Automatic Train Control

The bids which were requested during the latter part of 1923 for the installation of automatic train control upon a division each of the lines of this company, the New York Central Railroad, the Boston and Albany Railroad, the Cleveland, Cincinnati, Chicago and St. Louis Railway and the Pittsburgh and Lake Erie Railroad were received and considered, and as a result contracts for the purchase of materials for the installation of the General Railway Signal system upon a division each of the Michigan Central Railroad, the Boston and Albany and the Cleveland, Cincinnati, Chicago and St. Louis, the Sprague system upon a division of the New York Central and the Union Switch and Signal system upon a division of the Pittsburgh and Lake Erie were made in March, the materials to be purchased from the manufacturers of the designated devices and the installations to be made by company forces in each instance. Work proceeded and at the close of the year upon this company's line twenty miles of double-track had been installed and three engines had been equipped. Upon the New York Central twenty miles of double-track had been installed and were in operation with fifteen engines.

The order of June 13, 1922, of the Interstate Commerce Commission, fixed January 1, 1925, as the time for a full division installation upon each of these roads and other roads of the country. That time was, upon application, extended to July 1, 1925.

On January 14, 1924, the Interstate Commerce Commission made a further order requiring the installation of automatic train control devices upon a second division of each of the above roads, but no work has been done under that order.

Up to the close of 1924, this company had made expenditures or was committed to future outlay for automatic train control to the extent of approximately $81,000.

New receiving and classification yard at North Toledo

The new northbound yard at the Ohio-Michigan state line just north of Toledo was completed and put in operation in September, greatly facilitating the handling of traffic through the Toledo gateway.

Extension of engine house facilities

The development of the automobile and allied industries at Lansing necessitated the construction of a new engine terminal on the Lansing Branch, a short distance north of that city, to house both road and switch engines. Additional stalls were constructed for engine houses at West Detroit and Jackson.

Appreciative acknowledgment is made to officers and employees of their loyal and efficient co-operation and service.

For the Board of Directors,

PATRICK E. CROWLEY,
President.

[Advertisement]

Railway Financial News

(*Continued from page* 116)

To issue $9,575,000 of New York, Chicago & St. Louis Railroad Company refunding-mortgage 5½ per cent gold bonds, series B, in refundment of $9,575,000 of the Toledo, St. Louis & Western Railroad Company prior-lien 3½ per cent bonds paid at maturity; said refunding-mortgage bonds to be pledged as collateral security for said note for $8,138,750.

That part of application, for authority to pledge said $9,575,000 refunding-mortgage bonds as collateral security for short-term notes and loans, was denied.

Richmond Business Interests Approve Merger.—The proposed acquisition of the Chesapeake & Ohio by the enlarged Nickel Plate System has been formally approved in a resolution adopted unanimously by the directors of the Richmond Chamber of Commerce.

Norfolk & Western.—*Lease of Virginian.*—This company has filed with the Interstate Commerce Commission its application for authority to acquire control of the Virginian by lease for 999 years on payment of operating expenses, taxes, interest on funded debt, corporate maintenance and an amount equivalent to 6 per cent on the stock.

Reading Company.—*Bond of Subsidiary.*—The Interstate Commerce Commission has granted authority to the Reading Company to extend from July 1, 1925, to July 1, 1975, the maturity of $1,000,000 Shamokin, Sunbury & Lewisburg first mortgage bonds, and to extend from July 1 1925, to July 1, 1945, the maturity of $1,000,000 second mortgage bonds of the same company.

Southern Pacific.—*Nevada Opposes Reopening of Central Pacific Case.*—The Nevada Public Service Commission has filed with the Interstate Commerce Commission a motion to dismiss the application of the Public Service Commission of Oregon for a reopening of the case in which the commission authorized the control of the Central Pacific by the Southern Pacific. It says that large and important improvements in the lines of the Southern Pacific and Central Pacific have been undertaken and are now being carried on upon the faith of the commission's order which are of great value to the state of Nevada and its inhabitants and that the question of desired new extensions in Oregon should be considered on its merits and separately without reopening this case.

Acquisition.—This company has applied to the Interstate Commerce Commission for authority to acquire control of the Oregon, California & Eastern by stock ownership, in accordance with a contract with Robert E. Strahorn.

Acquisition of California Railway.—The Interstate Commerce Commission has issued a certificate authorizing the Southern Pacific Company to purchase and operate 2.5 miles of track, known as the California Railway, in Oakland, Calif. The mileage has hitherto been operated by the Key Transit System Company and serves an industrial district.

Control of the Lake Tahoe.—The Interstate Commerce Commission has approved the lease by the Southern Pacific of the Lake Tahoe Railway & Transportation Company, a narrow gage line extending from Truckee, Nev., to Tahoe City, Calif., 16.5 miles. The Southern Pacific Company proposes to convert the Tahoe Company's line to standard gage at a cost of approximately $298,000.

Virginian.—*Equipment Trust Certificates.*—This company has applied to the Interstate Commerce Commission for authority for an issue of $3,600,000 of 4½ per cent equipment trust certificates, for the purchase of 36 electric locomotives, to be sold to Lee, Higginson & Co., at 97.125.

Wabash.—*Acquisition of Ann Arbor Stock.*—This company has filed with the Interstate Commerce Commission its application for authority to acquire control of the Ann Arbor by purchase of 8,400 shares of preferred stock and 6,935 shares of common stock, in addition to 10,929 shares of preferred and 13,352 shares of common already acquired.

Railway Officers

Executive

C. H. Markham, president of the Illinois Central, has been elected also president of the Gulf & Ship Island, which the Illinois Central has acquired.

J. O. Apps, who was formerly in charge of the baggage and mail traffic of the ocean service of the Canadian Pacific, has been appointed general executive assistant, succeeding W. B. Howard, deceased.

Traffic

F. S. McGinnis, assistant passenger traffic manager of the Southern Pacific, with headquarters at Los Angeles, Cal., has been promoted to passenger traffic manager, with headquarters at San Francisco, succeeding **J. H. R. Parsons,** who has retired on pension on account of ill health. **C. L. McFaul,** assistant passenger traffic manager, with headquarters at San Francisco, has been transferred to Los Angeles in place of Mr. McGinnis. **F. C. Lathrop,** general passenger agent, with headquarters at San Francisco, has been promoted to assistant passenger traffic manager, with the same headquarters, succeeding Mr. McFaul. Mr. Parsons entered railway service on January 3, 1880, as a clerk in the treasurer's office of the Chicago & Grand Trunk, now a part of the Grand Trunk Western. He was later transferred to the stores department in Detroit, Mich., and remained there until April, 1886, when he entered the service of the Union Pacific at Omaha, Neb., in the stores department. Mr. Parsons subsequently held various positions in the auditing and passenger departments until July, 1906, when he was appointed chief clerk to the assistant director of traffic of the Union Pacific and the Southern Pacific, with headquarters at Chicago. He was promoted on January 1, 1909, to general passenger agent of the Southern Pacific, Louisiana lines, with headquarters at New Orleans, La. He was elected vice-president and general manager on January 1, 1917, and was appointed assistant passenger traffic manager of the Southern Pacific System, with headquarters at San Francisco, in March, 1923. Later in the same year he was promoted to passenger traffic manager, which position he held until his retirement. Mr. McGinnis was born on January 25, 1883, at Los Angeles, and entered railway service in September, 1900, as an office boy in the freight house of the Southern Pacific in that city. He later served successively as Pullman clerk, ticket clerk and cashier in the city ticket office, and was then promoted to city passenger agent at Los Angeles. He was later promoted to commercial agent at Pasadena, Cal., and was subsequently promoted to district passenger agent, with headquarters at Los Angeles. In April, 1915, Mr. McGinnis was promoted to general passenger agent, with the same headquarters, and he held that position until August, 1923, when he was promoted to assistant passenger traffic manager. He continued in that position until his recent promotion to passenger traffic manager.

F. S. McGinnis

J. H. R. Parsons

William Culp has been appointed general agent of the Wabash, with headquarters at Salt Lake City, Utah, succeeding **J. L. Yundt,** who has retired from active service.

T. E. Harris, traffic manager of the Gulf & Ship Island, has been appointed general agent of the Illinois Central, with headquarters at Gulfport, Miss., pursuant to the acquisition of the Gulf & Ship Island by the Illinois Central.

C. L. Kennedy, assistant general freight agent of the Chicago, Milwaukee & St. Paul, with headquarters at Minneapolis, Minn., has been promoted to general northwestern freight agent, with the same headquarters, a newly created position.

Financial, Legal and Accounting

George J. Adams, assistant to the vice-president in charge of treasury, accounting and corporate work of the Pennsylvania, has been advanced to the position of chief of corporate work. His office will continue to be at Philadelphia. **C. M. South,** assistant to the vice-president in charge of treasury, accounting and corporate work, with headquarters at Pittsburgh, has become assistant chief of corporate work. **Howard W. Schotter,** chief clerk to the president, and **George H. Pabst, Jr.,** chief clerk to the vice-president in charge of treasury, accounting and corporate work, have been advanced to the posts of treasury analysts, and in that capacity will be transferred to the treasury department. They will devote their attention to the financial affairs of the company, under the direction of the vice-president and the treasurer.

Operating

F. Duffy has been appointed trainmaster of the Tampa & Gulf Coast and the Tampa Northern, with headquarters at Tampa, Fla.

J. A. Small has been appointed superintendent of the Southern Pacific of Mexico, with headquarters at Mazatlan, Sinaloa, succeeding M. J. Kingsbury, resigned.

R. B. Butler, assistant superintendent of the Eastern division of the St. Louis-San Francisco, with headquarters at Springfield, Mo., has been promoted to acting superintendent of the Western division, with headquarters at Enid, Okla., succeeding **W. H. Bevans,** who has been granted leave of absence.

L. T. Foster has been appointed trainmaster of the Virginia division of the Seaboard Air Line, with headquarters at Raleigh, N. C., succeeding **A. L. Pritchett,** who has been transferred to the Florida division. **J. C. Hyman** has been appointed terminal trainmaster, with headquarters at Richmond, Va., succeeding Mr. Foster. **R. P. Jourdan** has been appointed terminal trainmaster, in charge of the Tampa Terminal.

G. E. Gaylord, superintendent of the Stockton division of the Southern Pacific, with headquarters at Stockton, Cal., has been transferred to the Los Angeles division, with headquarters at Los Angeles, Cal., succeeding **W. H. Whalen,** who has retired on pension. **William Wilson,** superintendent of the Tucson division, with headquarters at Tucson, Ariz., has been transferred to the Stockton division, in place of Mr. Gaylord. **H. S. Fairbank,** superintendent of the New Mexico division, with headquarters at El Paso, Tex., has been transferred to the Tucson division, succeeding Mr. Wilson. **C. M.**

Murphy, assistant superintendent of the Los Angeles division, with headquarters at Los Angeles, has been transferred to the New Mexico division, succeeding Mr. Fairbank. **A. F. Bowles,** assistant superintendent of the Los Angeles division, has been promoted to superintendent of the San Joaquin division, with headquarters at Bakersfield, Cal., succeeding **W. L. Hack,** transferred to the Sacramento division. **H. A. Culp,** assistant superintendent of the Shasta division, with headquarters at Dunsmuir, and **H. R. Gernreich,** terminal trainmaster at Oakland, Cal., have been transferred to Los Angeles, succeeding Messrs. Murphy and Bowles.

J. W. Daniel, who has been promoted to superintendent of the Atlantic Coast Line, with headquarters at Savannah, Georgia, was born on September 12, 1880, in Memphis, Tennessee, and attended college at Raleigh, North Carolina, for three years. He entered railway service with the Seaboard Air Line when he was fourteen years of age, and left the service of that company in 1903 to go with the Southern as a train dispatcher at Columbia, South Carolina. He entered the service of the Atlantic Coast Line in June, 1905, and sometime later again returned to the Seaboard Air Line. In March, 1907, he became a chief dispatcher for the Atlantic Coast Line. In March, 1918, he was promoted to the position of trainmaster, which he held at the time of his recent advancement to the position of superintendent at Savannah.

J. W. Daniel

Mechanical

H. L. Hanna, mechanical engineer of the New York, Chicago & St. Louis, has resigned.

John R. Jackson has been appointed engineer of tests of the Missouri Pacific, with headquarters at St. Louis, Mo., a newly created position.

E. Von Bergen, air brake and lubricating engineer of the Illinois Central, with headquarters at Chicago, has been promoted to general air brake, lubricating and steam heat engineer, with the same headquarters, a newly created position.

Engineering, Maintenance of Way and Signaling

C. R. Harding, consulting engineer of the Southern Pacific, whose headquarters were removed from New York to San Francisco recently, has now been appointed engineer of standards, with headquarters in the latter city. He will have supervision of standards other than those of the motive power department and will assist the president in engineering matters.

Purchasing and Stores

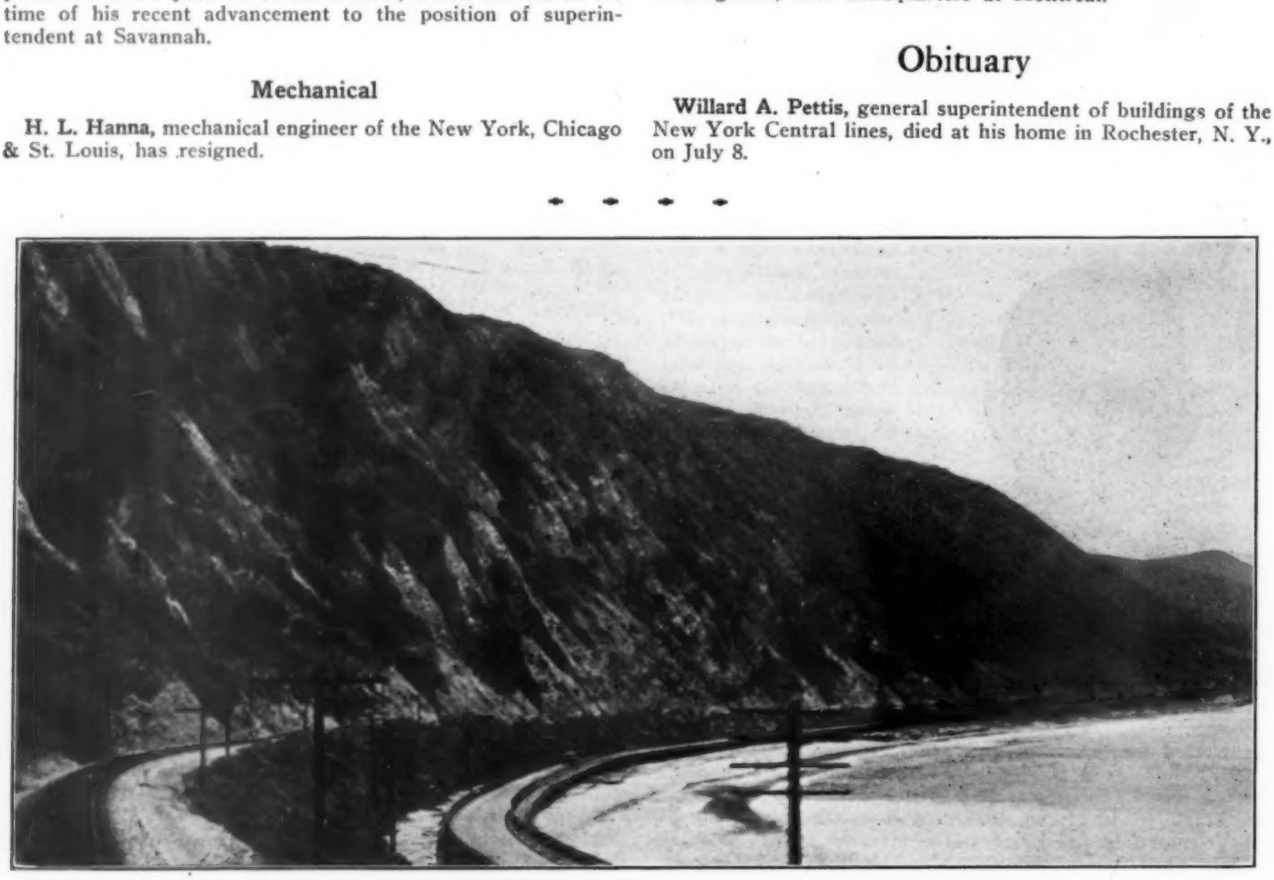
F. W. Mahl, director of purchases of the Southern Pacific, whose headquarters were recently changed from New York to San Francisco, has now been appointed general purchasing agent, with headquarters in the latter city. He will have general supervision of the purchasing and stores departments of the company.

Special

Brigadier-General E. de B. Panet, has been appointed chief of the department of investigation of the Canadian Pacific, succeeding **R. G. Chamberlin,** deceased. **A. H. Cadieux,** formerly assistant to the chief of the department of investigation, who, with the title of acting chief, has fulfilled the duties of the office formerly held by Mr. Chamberlin, since the latter's death, has been appointed assistant chief of the department of investigation, with headquarters at Montreal.

Obituary

Willard A. Pettis, general superintendent of buildings of the New York Central lines, died at his home in Rochester, N. Y., on July 8.



A Section of the Southern Pacific Along the Coast Between Los Angeles and San Francisco